DEMICHEV, A.D.; YENGOVATOV, A.A.; KUZNETSOV, N.N.; KOSTYUKOVICH, N.I.; ULYUYEV, D.I.; USHAKOV, S.M.; LIDERS, G.V., kandidat tekhnicheskikh nauk, redaktor; BOBROVA, Ye.N., tekhnicheskiy redaktor

[Mechanizing work in major repairing of railroad tracks; experience of track machinery stations] Mekhanizatsiia rabot po kapital'nomu remontu puti; opyt putevykh mashinnykh stantsii. Moskva, Gos. transp.zhel-dor.izd-vo, 1957. 107 p. (MLRA 10:9)
(Railroads--Track)

MALITSKIY, L.Ya., inzhener--USHAKOV, S.M., inzhener.

The "Matiza" ballast cleaning machine. Put' i put. knox. no.2:46 F '57.
(Switzerland--Ballast) (MLRA 10:4)

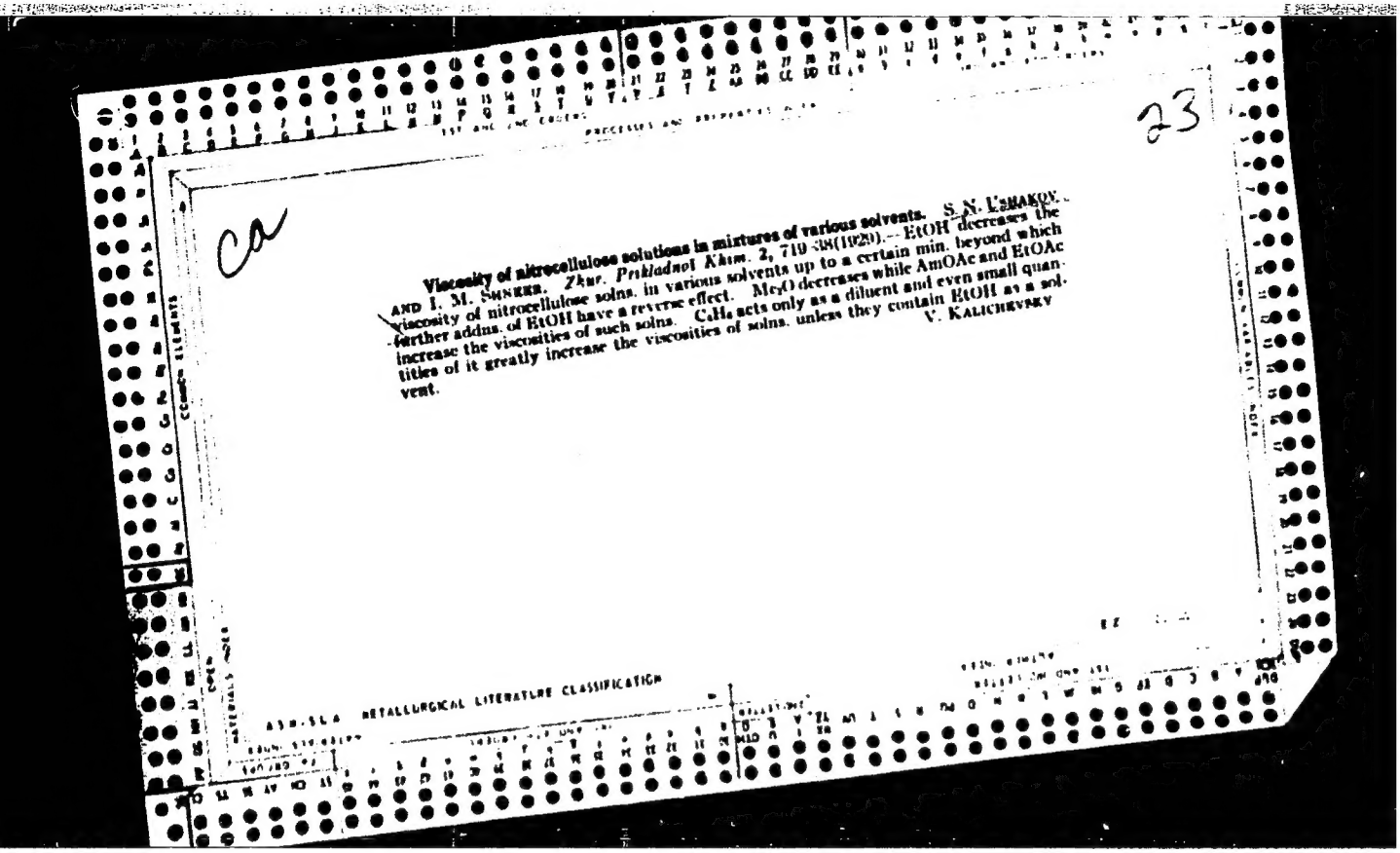
USHAKOV, S.M., inzh.

How to repair the hoisting unit of the B-5 ballast distributor. (MIRA 11:4)
Put' i put. khoz. no.3:35-36 Mr '58.
(Ballast (Railroads))

USHAKOV, S.M.; zasluzhennyy deyatel' nauki i tekhniki RSFSR, Leningrad.

Polymers in medicine. Nauka i zhyttia 11 no.2:28 F '61. (MIRA 14:3)

1. Chlen-korrespondent AN SSSR.
(POLYMERS) (MEDICAL SUPPLIES)



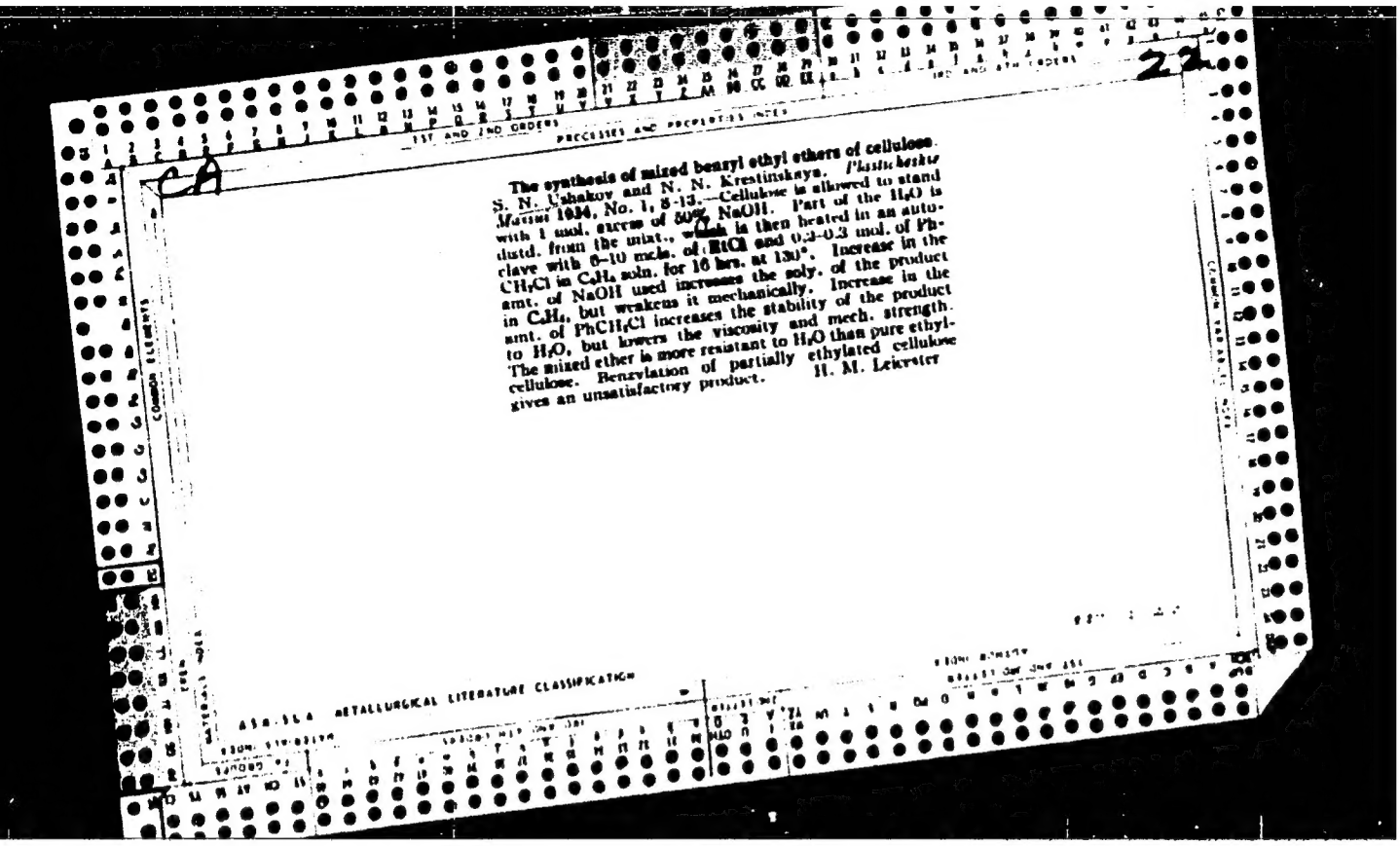
23

CA

Viscosity of nitrocellulose solutions in mixtures of various solvents. S. N. LEBEDEV AND I. M. SMNERR. *Zhur. Prikladnoi Khim.* 2, 719-38(1929).—EtOH decreases the viscosity of nitrocellulose solns. in various solvents up to a certain min. beyond which further addns. of EtOH have a reverse effect. MeyO decreases while AmOAc and EtOAc increase the viscosities of such solns. CaH_2 acts only as a diluent and even small quantities of it greatly increase the viscosities of solns. unless they contain EtOH as a solvent.

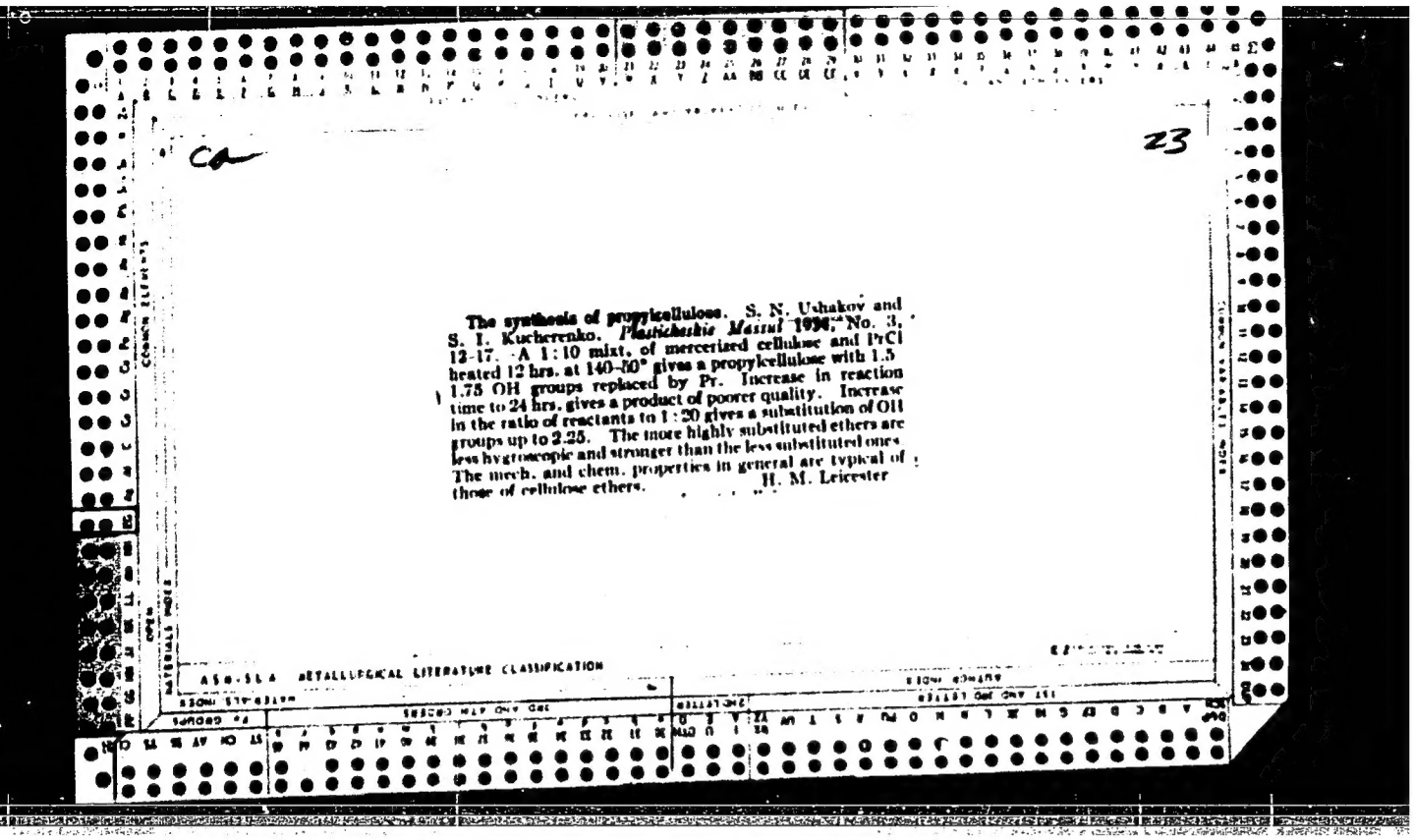
V. KALICHEVSKY

ASM-SLA METALLURGICAL LITERATURE CLASSIFICATION



CA

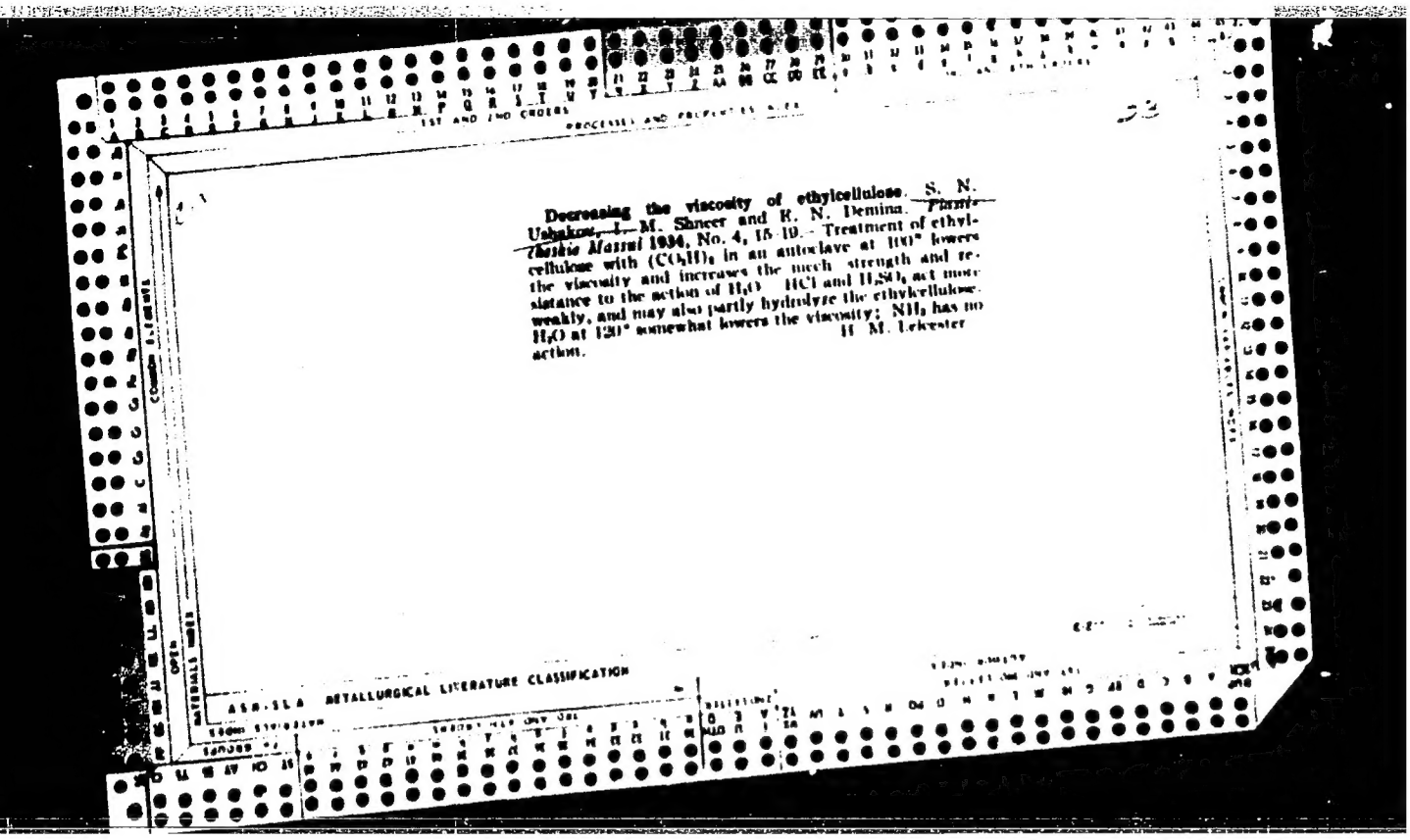
The synthesis of mixed benzyl ethyl ethers of cellulose. S. N. Ushakov and N. N. Krestinskaya. *Plasticheskie Massui* 1934, No. 1, 8-13.—Cellulose is allowed to stand with 1 mol. excess of 50% NaOH. Part of the H_2O is distd. from the mixt., which is then heated in an autoclave with 6–10 mols. of EtCl and 0.2–0.3 mol. of $PhCH_2Cl$ in C_6H_6 soln. for 16 hrs. at 130°. Increase in the amt. of NaOH used increases the soly. of the product in C_6H_6, but weakens it mechanically. Increase in the amt. of $PhCH_2Cl$ increases the stability of the product to H_2O, but lowers the viscosity and mech. strength. The mixed ether is more resistant to H_2O than pure ethylcellulose. Benzylation of partially ethylated cellulose gives an unsatisfactory product. H. M. Leicester



CA

23

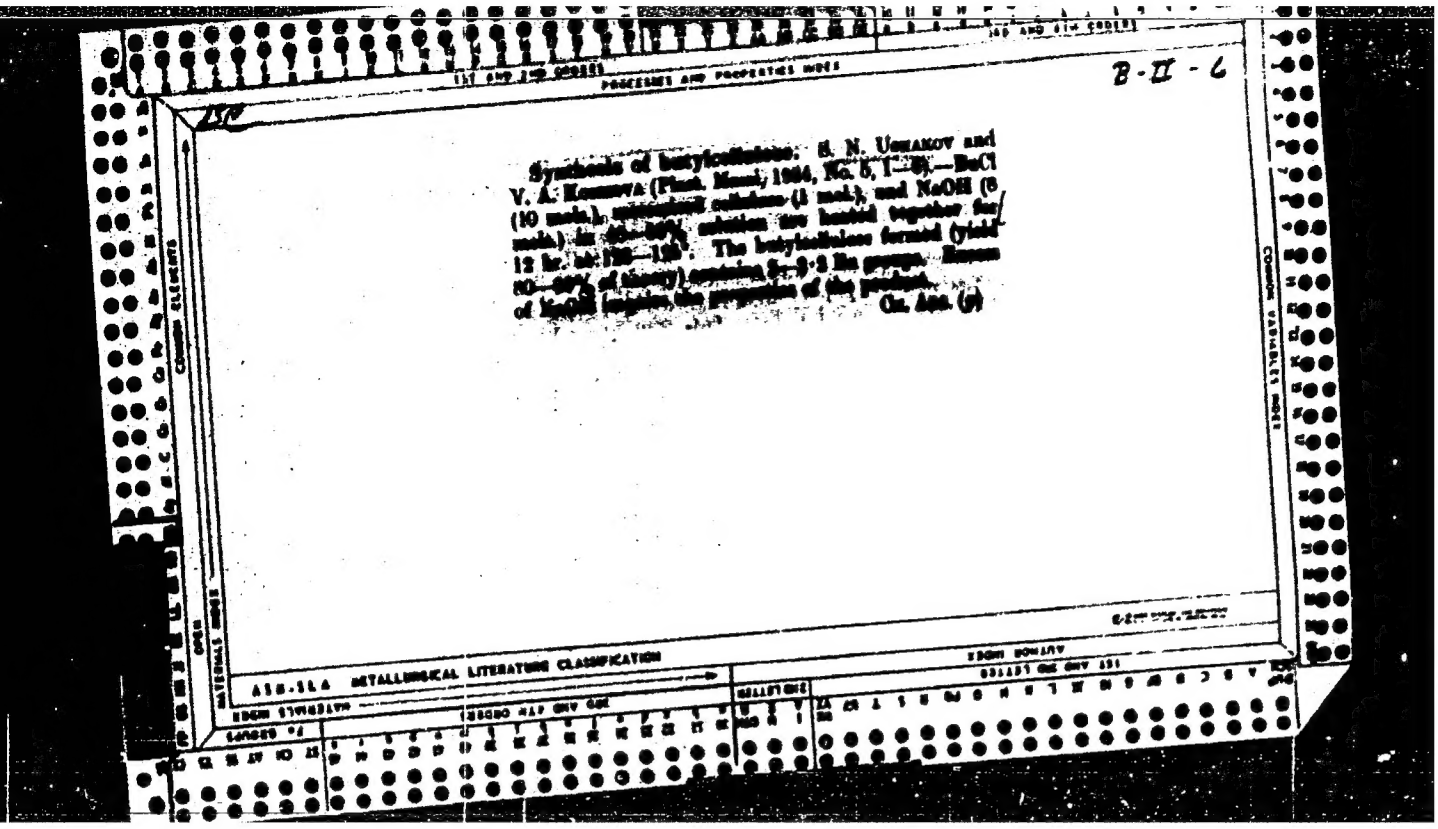
The synthesis of propylcellulose. S. N. Ushakov and S. I. Kucherenko. *Plasticheskie Massui* 1936, No. 3, 12-17. -A 1:10 mixt. of mercerized cellulose and PrCl heated 12 hrs. at 140-50° gives a propylcellulose with 1.5-1.75 OH groups replaced by Pr. Increase in reaction time to 24 hrs. gives a product of poorer quality. Increase in the ratio of reactants to 1:20 gives a substitution of OH groups up to 2.25. The more highly substituted ethers are less hygroscopic and stronger than the less substituted ones. The mech. and chem. properties in general are typical of those of cellulose ethers. H. M. Leicester

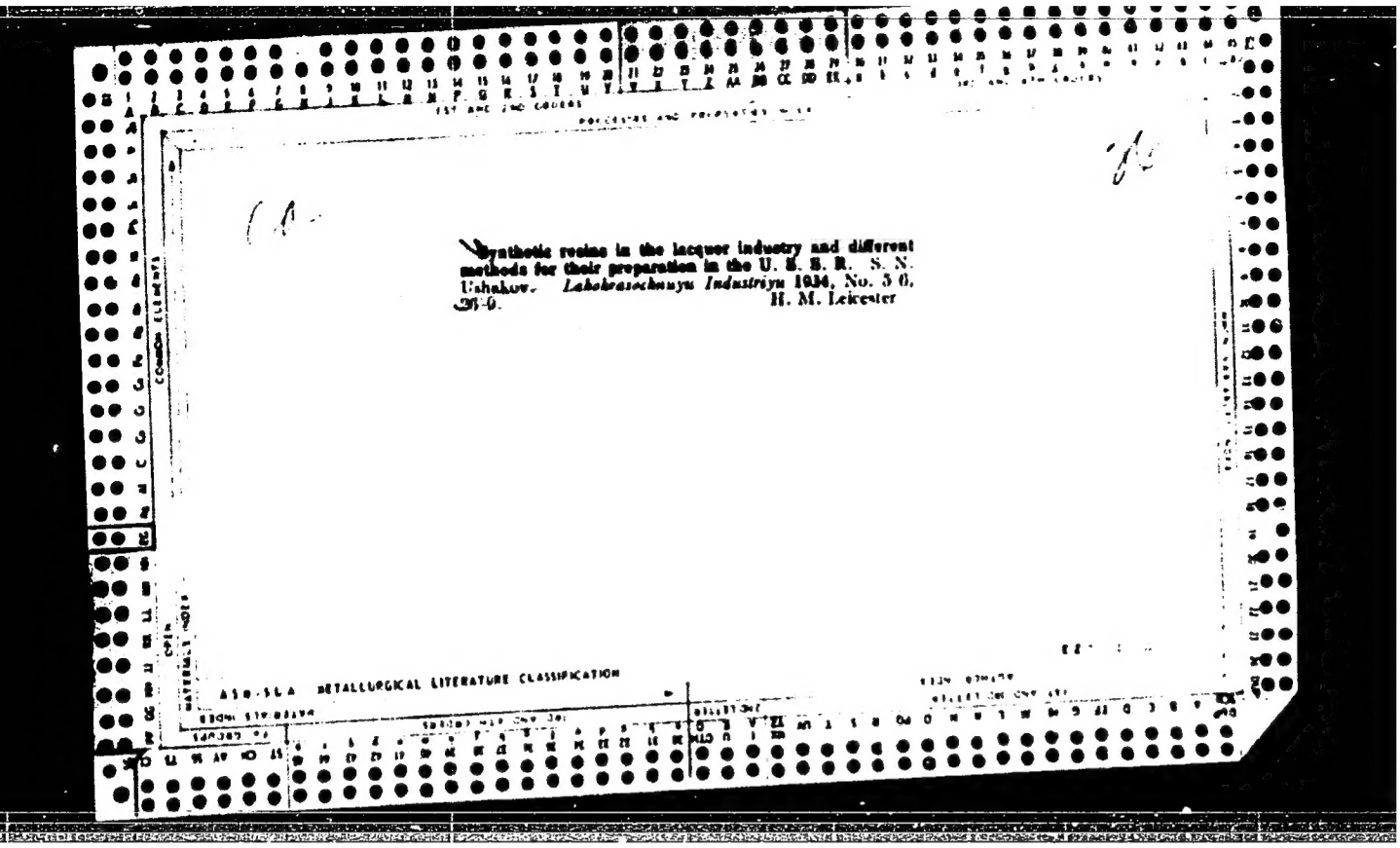


Decreasing the viscosity of ethylcellulose. S. N. Ushakov, I. M. Shneer and E. N. Demina. *Plasti-cheskie Massui* 1934, No. 4, 15-19. - Treatment of ethylcellulose with $(C_6H_5)_2$ in an autoclave at 100° lowers the viscosity and increases the mech. strength and resistance to the action of H_2O. HCl and H_2SO_4 act more weakly, and may also partly hydrolyze the ethylcellulose. H_2O at 120° somewhat lowers the viscosity; NH_3 has no action.

H. M. Leicester

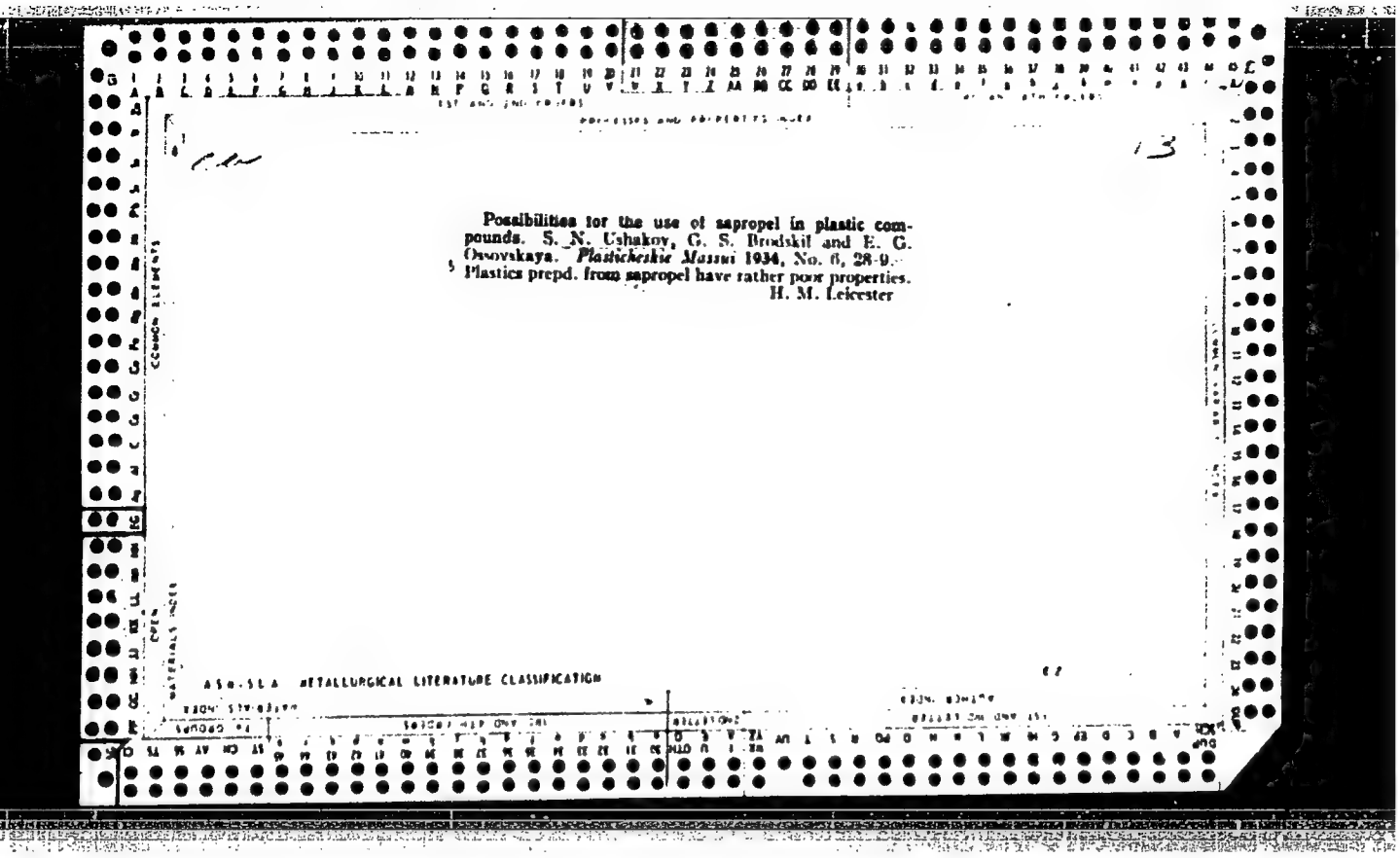
A58.51A METALLURGICAL LITERATURE CLASSIFICATION



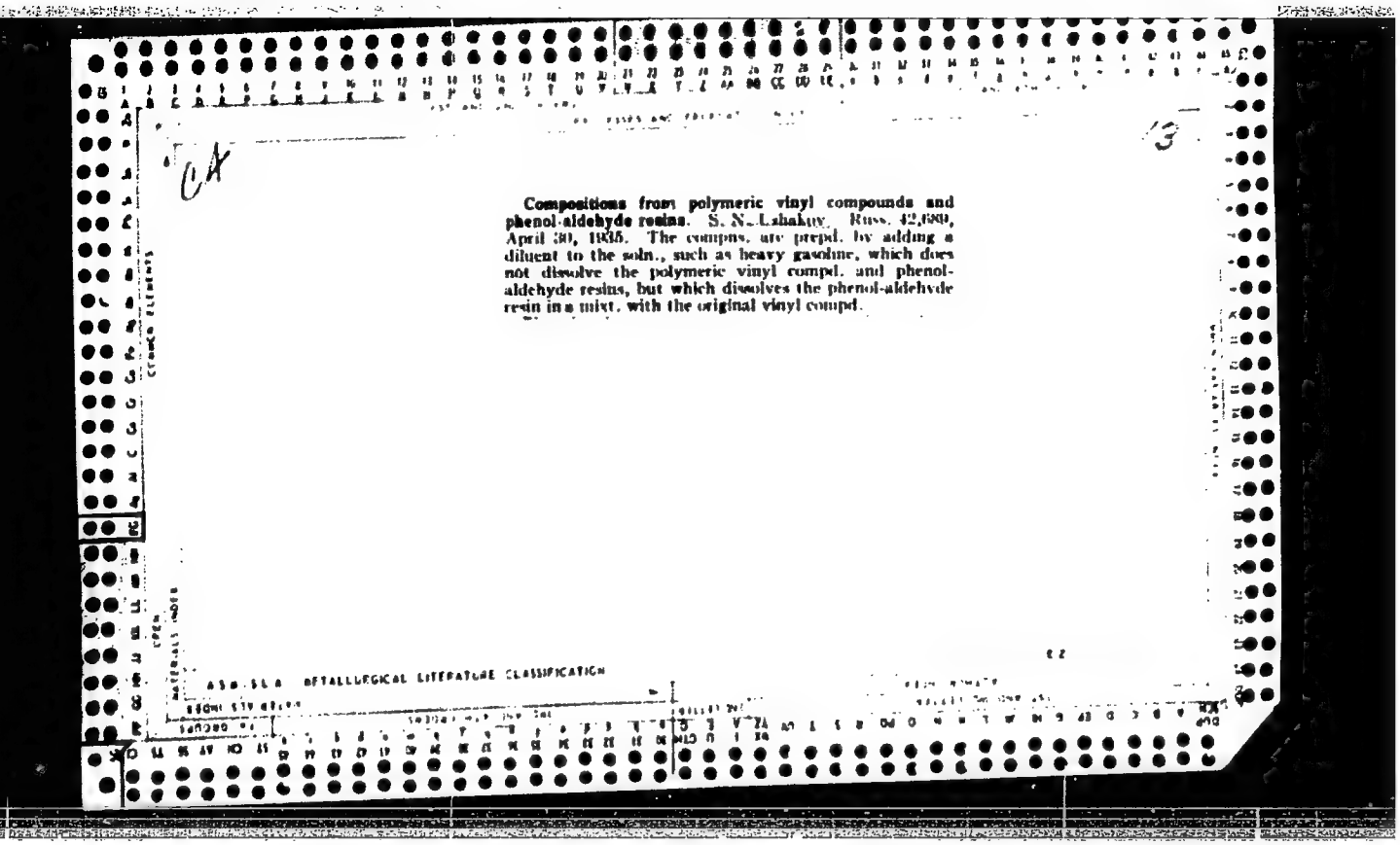


Synthetic resins in the lacquer industry and different methods for their preparation in the U. S. S. R. S. N. Ushakov. *Lakokrasochnaya Industriya* 1934, No. 5 6, 29-0.
H. M. Leicester

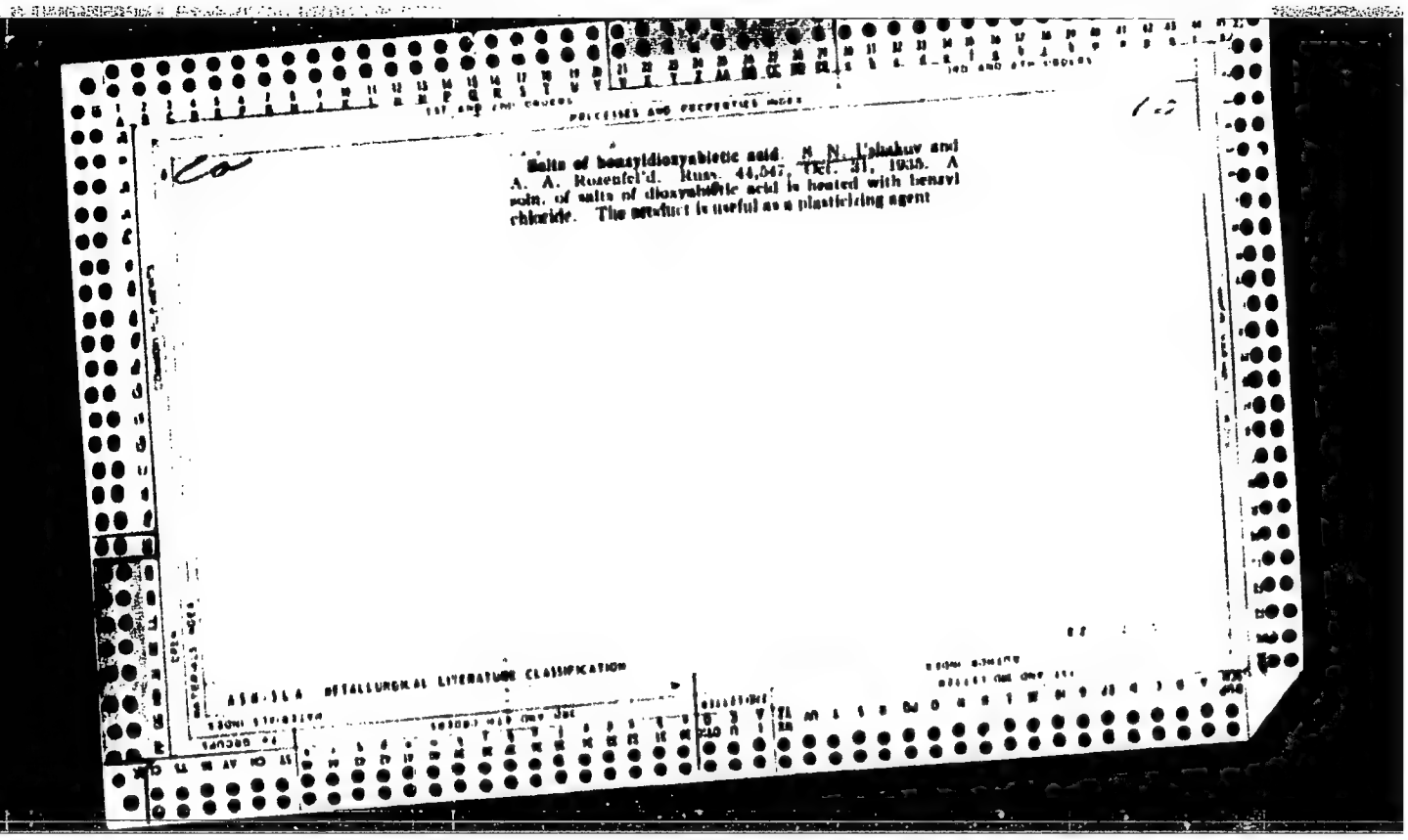
A10-51A METALLURGICAL LITERATURE CLASSIFICATION



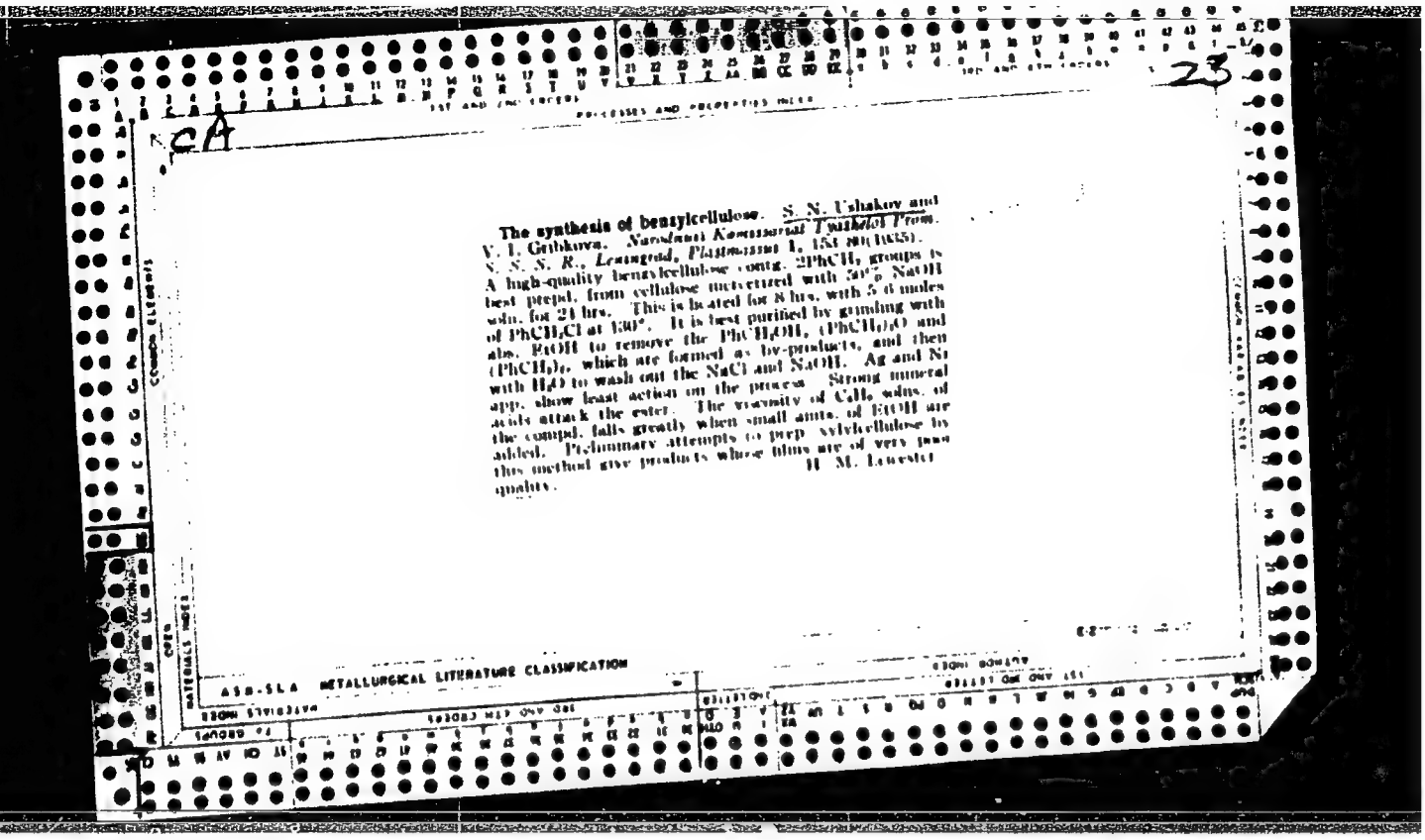
Possibilities for the use of sapropel in plastic compounds. S. N. Ushakov, G. S. Brodskil and E. G. Osovskaya. *Plasticheskie Massui* 1934, No. 6, 28-9.—Plastics prepd. from sapropel have rather poor properties.
H. M. Leicester



Compositions from polymeric vinyl compounds and phenol-aldehyde resins. S. N. Ushakov. Russ. 42,690, April 30, 1935. The compns. are prepd. by adding a diluent to the soln., such as heavy gasoline, which does not dissolve the polymeric vinyl compd. and phenol-aldehyde resins, but which dissolves the phenol-aldehyde resin in a mixt. with the original vinyl compd.

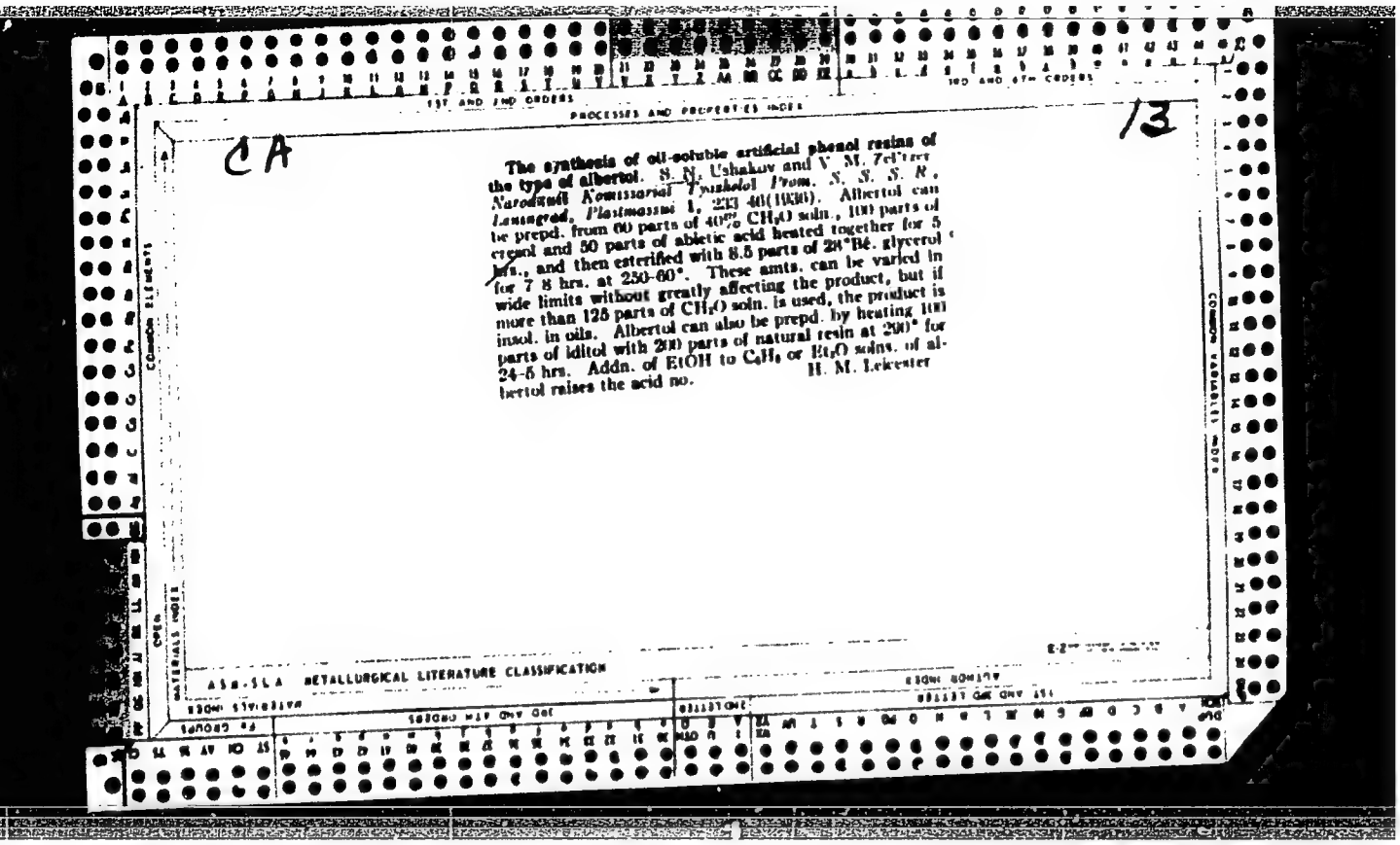


Salts of benzyldioxyabietic acid. N. N. Ushakov and A. A. Rosenfel'd. Russ. 44,047, Oct. 31, 1935. A soln. of salts of dioxyabietic acid is heated with benzyl chloride. The product is useful as a plasticizing agent



The synthesis of benzylcellulose. S. N. Ushakov and V. I. Gribkova. *Nauchnoi Konferentsii Tsellyul. Prom. S. S. S. R., Leningrad, Plastmassy* 1, 153-80 (1955). A high-quality benzylcellulose contg. 2PhCH$_2$ groups is best prepd. from cellulose mercerized with 30% NaOH soln. for 24 hrs. This is heated for 8 hrs. with 5 d moles of PhCH$_2$Cl at 130°. It is best purified by grinding with abs. EtOH to remove the PhCH$_2$OH, (PhCH$_2$)$_2$O and (PhCH$_2$)$_2$, which are formed as by-products, and then with H$_2$O to wash out the NaCl and NaOH. Ag and Ni app. show least action on the process. Strong mineral acids attack the ester. The viscosity of CaHe solns. of the compd. falls greatly when small amts. of EtOH are added. Preliminary attempts to prep. xylylcellulose by this method give products whose films are of very poor quality.

H. M. Leicester

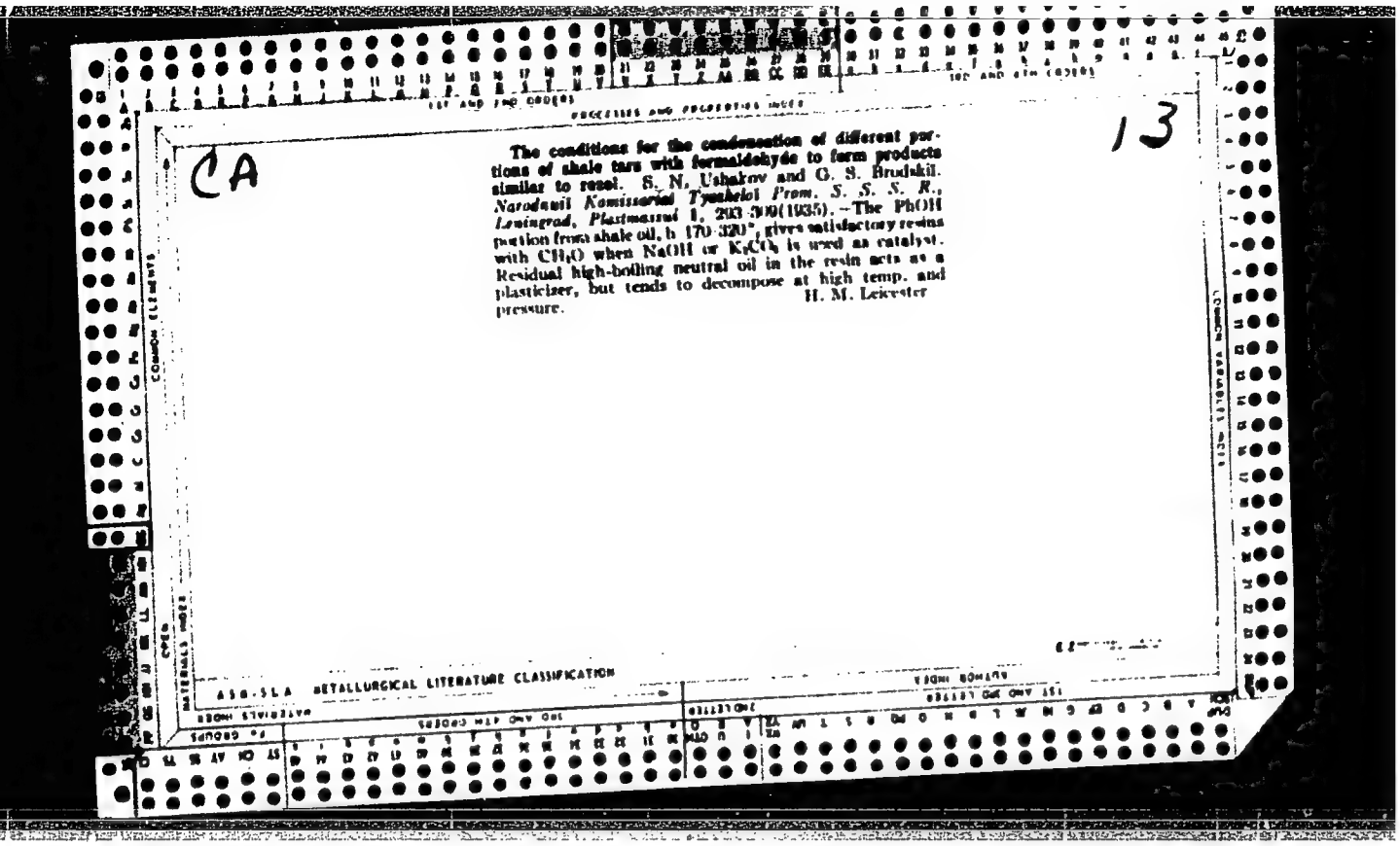


CA

13

The synthesis of oil-soluble artificial phenol resins of the type of albertol. S. N. Ushakov and V. M. Zelinger. *Narodnuii Kommissariat Tyazhelol Prom. S. S. S. R., Lensnpred, Plastmassui* 1, 213-40(1938). Albertol can be prepd. from 60 parts of 40% CH_2O soln., 100 parts of cresol and 50 parts of abietic acid heated together for 5 hrs., and then esterified with 8.5 parts of 28°Bé. glycerol for 7-8 hrs. at 250-60°. These amts. can be varied in wide limits without greatly affecting the product, but if more than 125 parts of CH_2O soln. is used, the product is insol. in oils. Albertol can also be prepd. by heating 100 parts of iditol with 200 parts of natural resin at 290° for 24-5 hrs. Addn. of EtOH to C_6H_6 or Et_2O solns. of albertol raises the acid no.

H. M. Leicester



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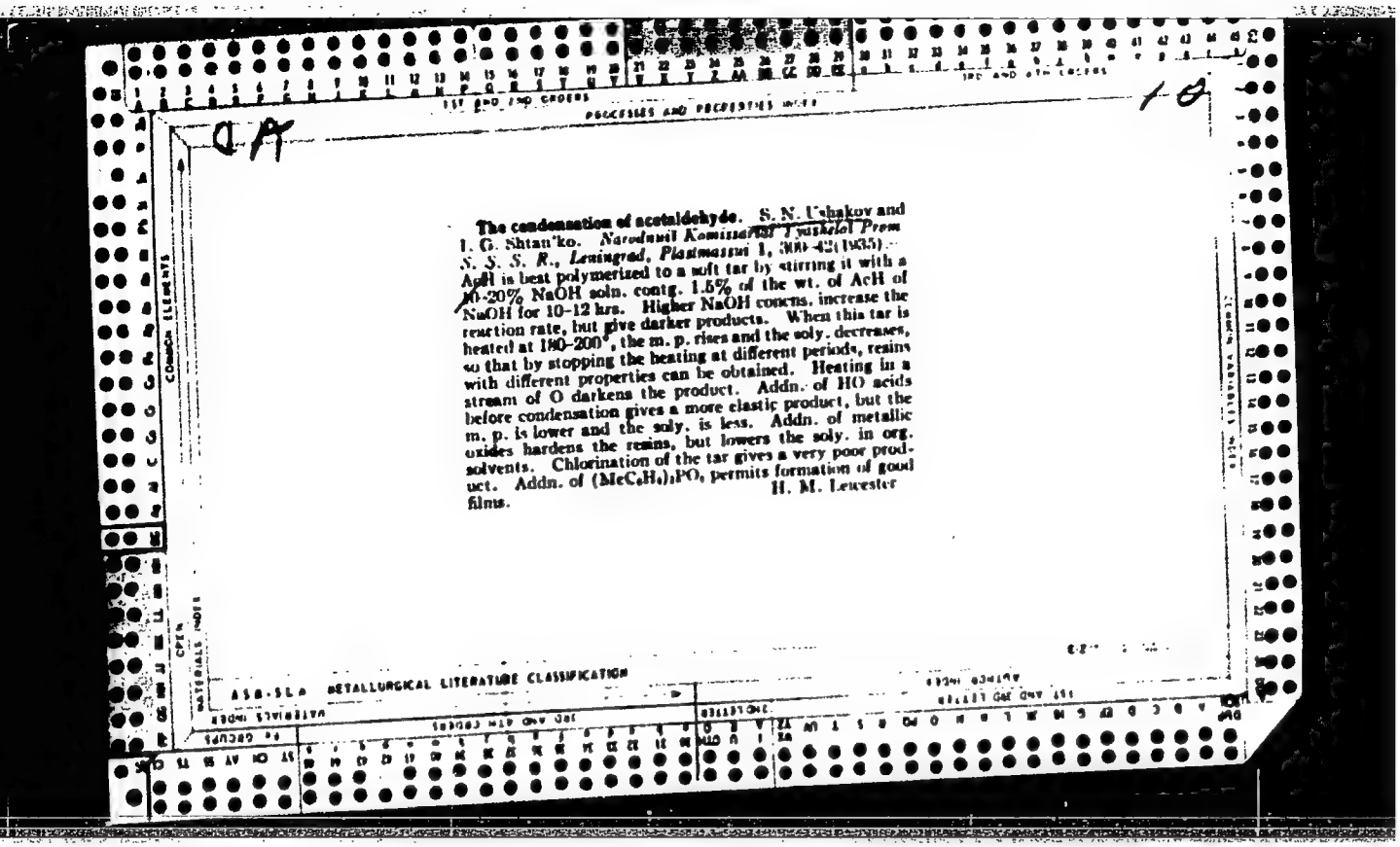
13

The conditions for the condensation of different portions of shale tars with formaldehyde to form products similar to resol. S. N. Ushakov and G. S. Brudskil. *Narodnuil Komissariat Tyazhelol Prom. S. S. S. R., Leningrad, Plastmassui* 1, 203-300(1935).—The PhOH portion from shale oil, b 170-320°, gives satisfactory resins with CH_2O when NaOH or K_2CO_3 is used as catalyst. Residual high-boiling neutral oil in the resin acts as a plasticizer, but tends to decompose at high temp. and pressure.

H. M. Leicester



The condensation of acetaldehyde. S. N. Ushakov and I. G. Shtan'ko. *Narodnuii Komissariat Tyazhelol Prom S. S. S. R., Leningrad, Plastmassui* 1, 300-42(1935).—AcH is best polymerized to a soft tar by stirring it with a 10-20% NaOH soln. contg. 1.5% of the wt. of AcH of NaOH for 10–12 hrs. Higher NaOH concns. increase the reaction rate, but give darker products. When this tar is heated at 180–200°, the m. p. rises and the soly. decreases, so that by stopping the heating at different periods, resins with different properties can be obtained. Heating in a stream of O darkens the product. Addn. of HO acids before condensation gives a more elastic product, but the m. p. is lower and the soly. is less. Addn. of metallic oxides hardens the resins, but lowers the soly. in org. solvents. Chlorination of the tar gives a very poor product. Addn. of $(MeC_6H_4)_3PO_4$ permits formation of good films.

H. M. Leicester

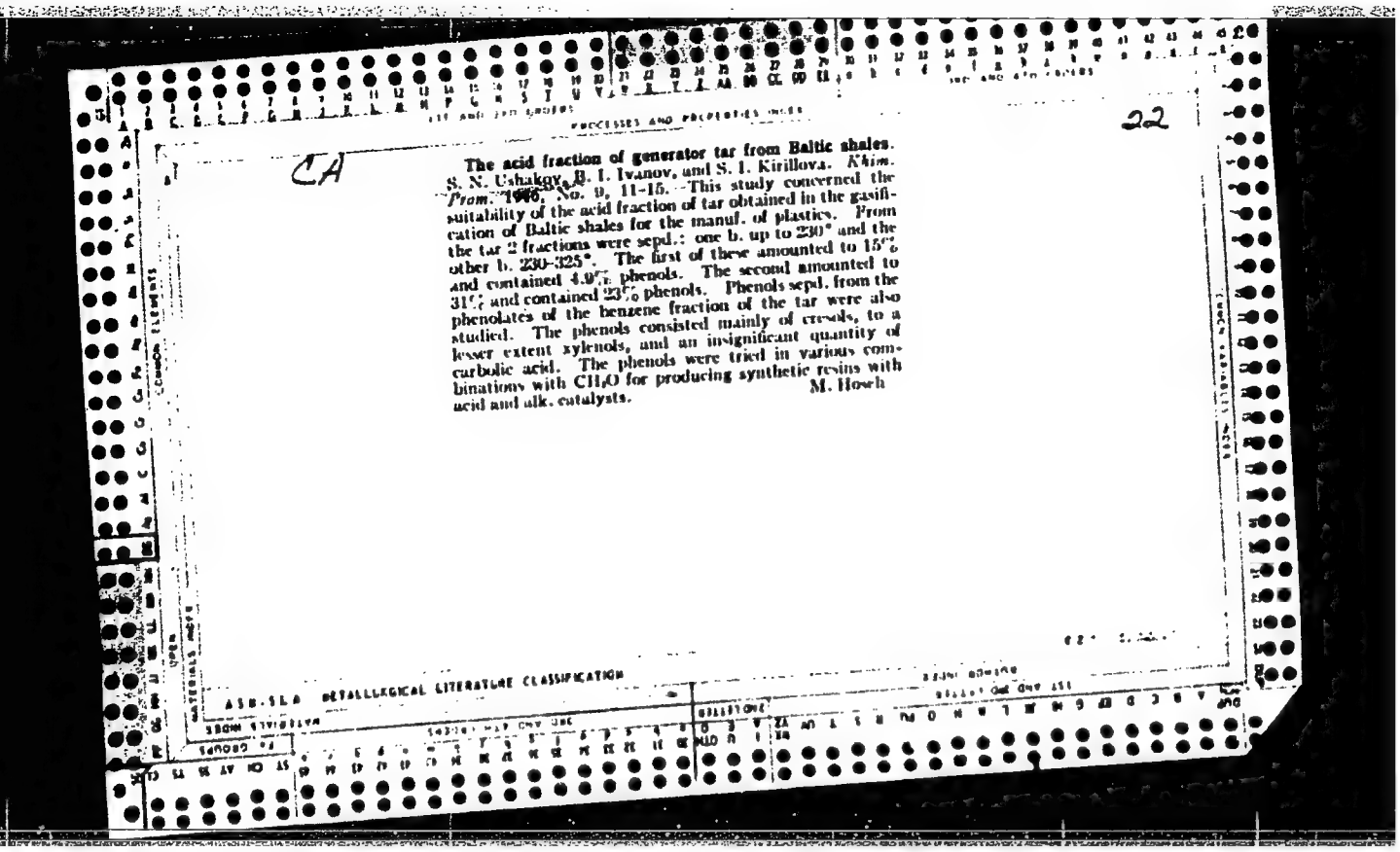
USHAKOV, S. N.

The phenol-lignin resins. S. N. Ushakov, I. I. Matveev, and O. B. Iv. Lesokhim. Prom. 1939, No. 1, 23-31; Khim. Referat, Zhur, 1939, No. 8, 111.--In condensation of phenol with tech. lignin (freed from cellulose and pentosans) by treatment for 14-15 hrs. at 135-40° and then for 4 hrs. at 170-80° with 5% of H_2SO_4 on the wt. of thenol, approx. 1 mol. of water is sepd. for each mol. of phenol. In general this verifies the reaction mechanism proposed by Wedekind. At 115-20°, up to 14% of lignin (on the wt. of phenol) can be added to the reaction mixt. Addn. of lignin to highly heated phenol causes much foam formation. At a lower temp. the amt. of lignin which can be added is considerably less. The optimum amt. of the catalyst (H_2SO_4) is 2.5% and the optimum time of condensation (phenol:lignin = 100:100) is 3 hrs. With the ratio 100:140 the optimum time is 5 hrs. The moisture content of the lignin should not exceed 15%. Approx. 2 parts by wt. of lignin is bound by 1 part of phenol. The m. p. of the resins (depending on their phenol contents) varies from 40 to 130°. They are sol. in alc. to the extent of 78-88%, in acetone to 90-2%; they are insol. in benzene and ether. They are similar to novolak resins.

W. R. Henn

USHAKOV, S. N.

Resins and plastic masses. S. N. Ushakov. U.S.S.R. 64,371. April 30, 1945. A fusion of phenol and alkali lignin is mixed with hexamethylenetetramine or with a solid polymer of CH_2O. In order to obtain an infusible and insol. end product, the quantity of hexamethylene-tetramine is approx. 10% of the fusion mass. M. Hosch



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22

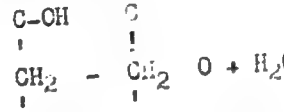
The acid fraction of generator tar from Baltic shales. S. N. Ushakov, B. I. Ivanov, and S. I. Kirillova. *Khim. Prom.* 1946, No. 9, 11–15.—This study concerned the suitability of the acid fraction of tar obtained in the gasification of Baltic shales for the manuf. of plastics. From the tar 2 fractions were sepd.: one b. up to 230° and the other b. 230–325°. The first of these amounted to 15% and contained 4.9% phenols. The second amounted to 31% and contained 23% phenols. Phenols sepd. from the phenolates of the benzene fraction of the tar were also studied. The phenols consisted mainly of cresols, to a lesser extent xylenols, and an insignificant quantity of carbolic acid. The phenols were tried in various combinations with CH_2O for producing synthetic resins with acid and alk. catalysts.

M. Hoch

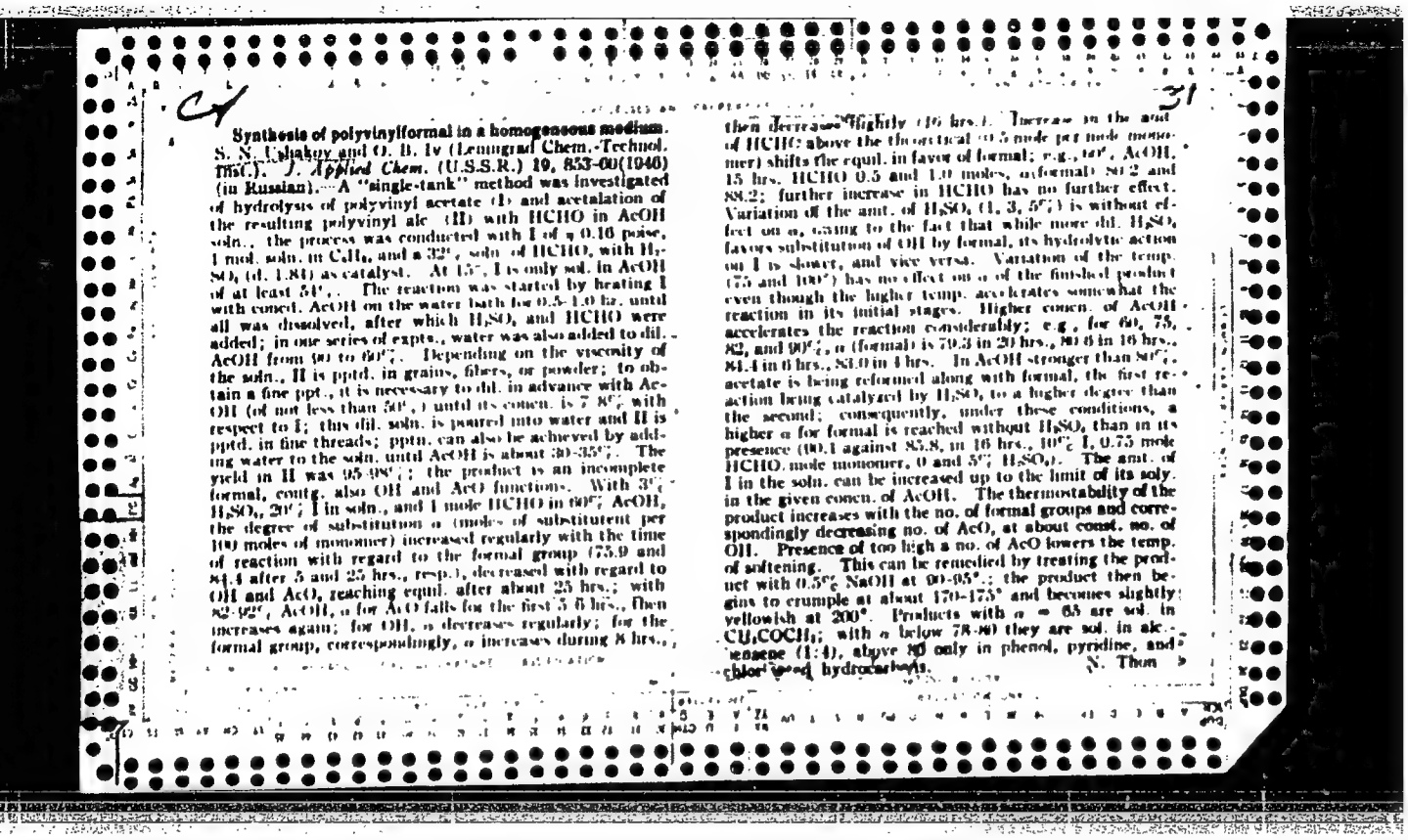
ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

USHAKOV, S. N.

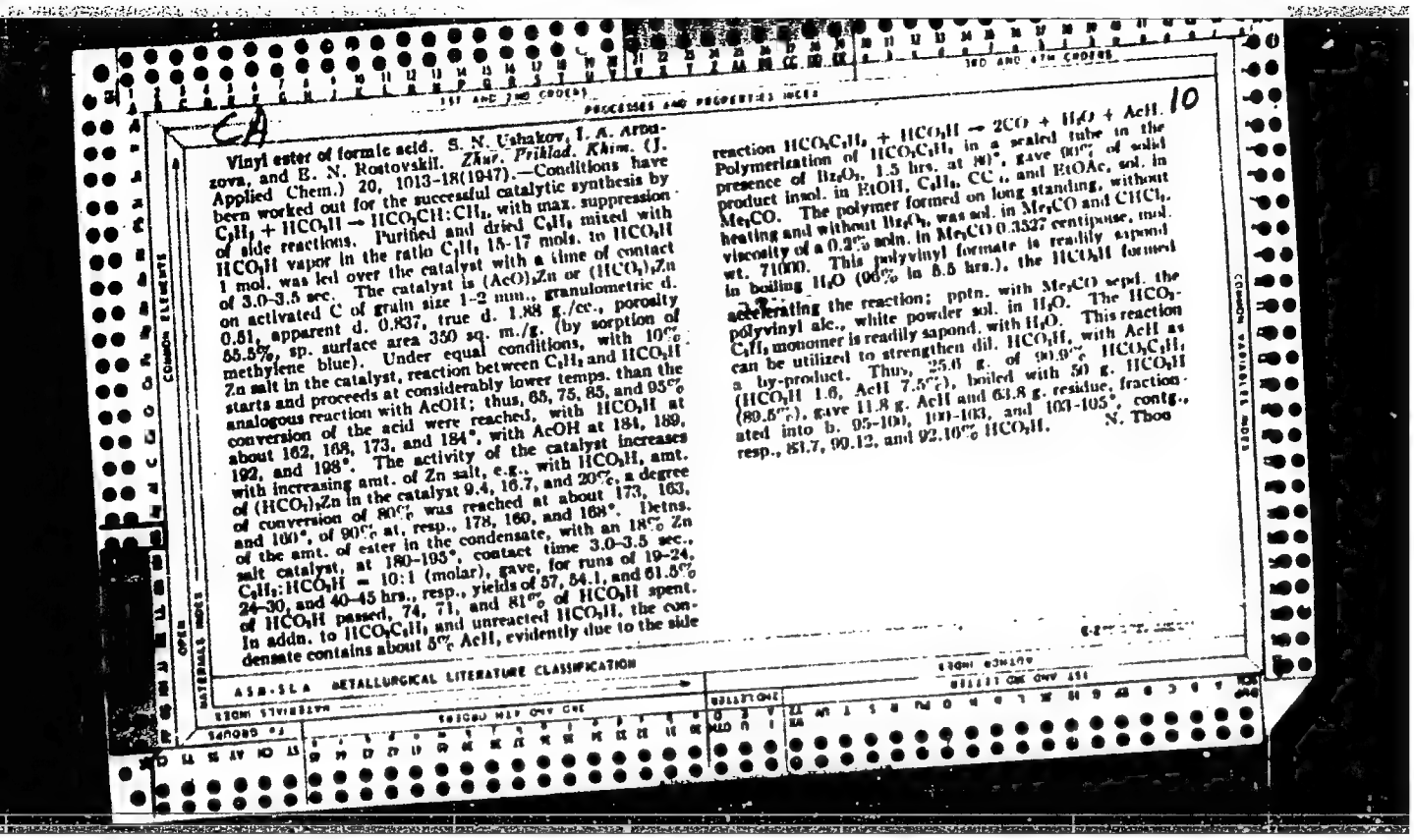
Synthesis of polyvinylbutyral in a heterogeneous medium. S. N. Ushakov, I. A. Arbuzova, and E. N. Rostovskii. J. Applied Chem. (U.S.S.R.) 19, 128-33 (1946).—Polyvinl alc. (I) was prepd. by hydrolysis of a 25% alc. soln. of the acetate with 10-13% H_2SO_4; polyvinyl formate is readily hydrolyzed in aq. medium. The acetalization took place very readily in aq. medium by dissolving 1-2 g. I, with 1.04-1.72 g. HCO_2H as catalyst, and 0.54 ml. of PrCHO in 10-27 vols. of water and heating to 40-60° 1-6.5 hrs; 1.27-2.5 g. of polyvinylbutyral, with 74-90% substitution, were obtained. The resultant product was lumpy with the lower, and a fine white powder with the higher amt. of water. Lower temps. gave a product with a lower acetal content and less aldehyde, swelling in water and filtering with difficulty. Adding 1% H_2SO_4 to 1 g. I in 17-20 ml. water, 1.04 g. HCO_2H, and 0.35-0.62 g. PrCHO gave 1.03-1.08 g. of a fine powder (representing 60.9-74% substitution) which became sticky on drying. Refluxing 3-5 g. I and a 0-1.2% acid solu. for 1 hrs. in benzene yielded 0.1-0.6 g. H_2O; continuing 12 to 4 hrs. longer in xylene gave and addnl. 0.42-1.1 g. H_2O. The authors postulate the formation of an anhydride, as the water collected corresponded to the theoretical amt. according to the reaction shown below: the presence of acid apparently accelerated it. Under the conditions of the reaction, I is a surface-active agent and foams strongly; the reaction takes place on the surface, leading to the gradual transformation of the foam to a solid aggregate of the acetal, depending on the concn.



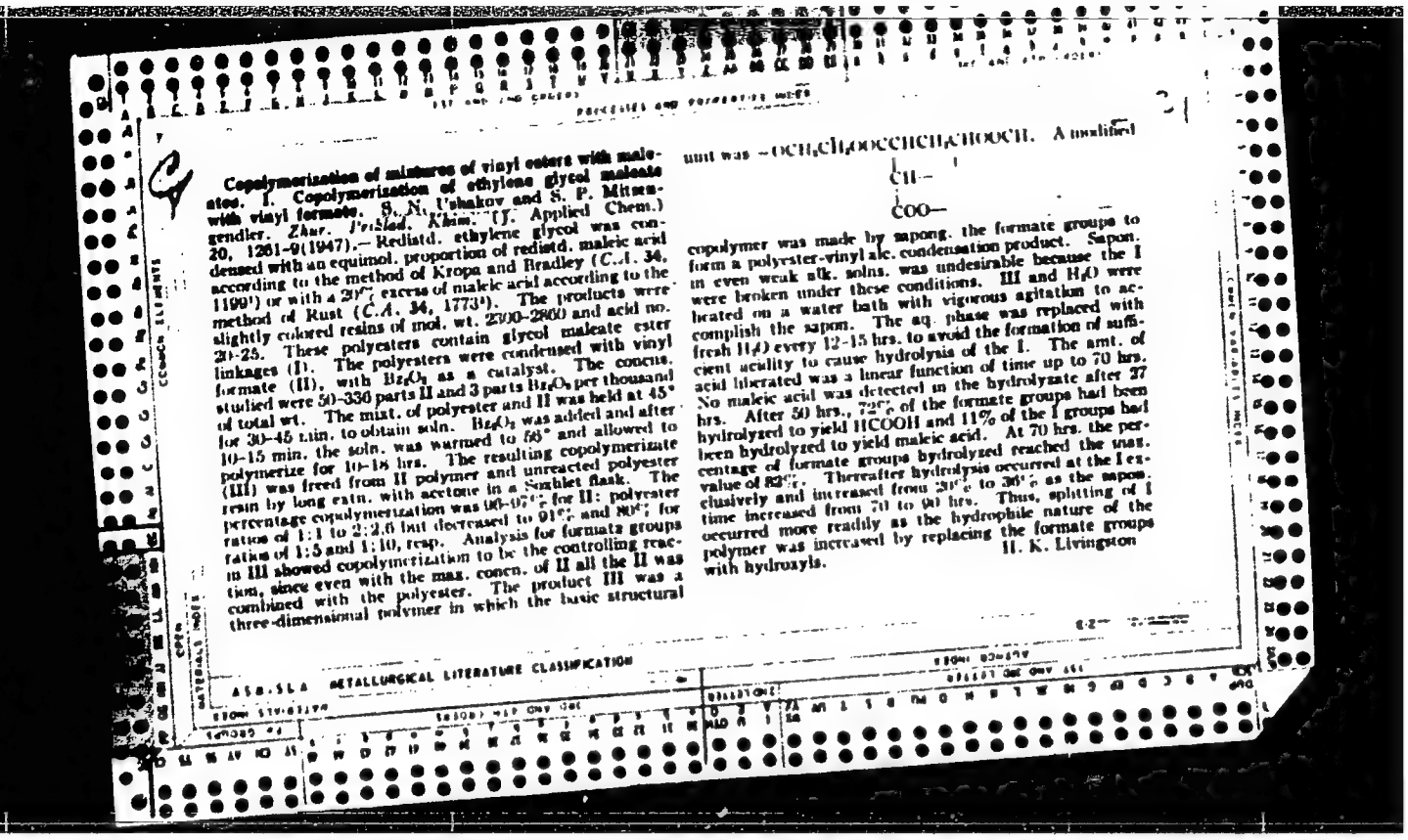
Boris Gutoff



Synthesis of polyvinylformal in a homogeneous medium. S. N. Ushakov and O. B. Iv (Leningrad Chem.-Technol. Inst.). *J. Applied Chem.* (U.S.S.R.) **19**, 853-60(1946) (in Russian).—A "single-tank" method was investigated of hydrolysis of polyvinyl acetate (I) and acetalation of the resulting polyvinyl alc. (II) with HCHO in AcOH soln., the process was conducted with I of η 0.16 poise, 1 mol. soln. in CH_4, and a 32°, soln. of HCHO, with H_2SO_4 (d. 1.84) as catalyst. At 15°, I is only sol. in AcOH of at least 54°. The reaction was started by heating I with concd. AcOH on the water bath for 0.5–1.0 hr. until all was dissolved, after which H_2SO_4 and HCHO were added; in one series of expts., water was also added to dil. AcOH from 90 to 60%. Depending on the viscosity of the soln., II is ppd. in grains, fibers, or powder; to obtain a fine ppt., it is necessary to dil. in advance with AcOH (of not less than 50%) until its concn. is 7–8%, with respect to I; this dil. soln. is poured into water and II is ppd. in fine threads; pptn. can also be achieved by adding water to the soln. until AcOH is about 30–35%. The yield in II was 95–98%; the product is an incomplete formal, contg. also OH and AcO functions. With 3% H_2SO_4, 20% I in soln., and 1 mole HCHO in 60% AcOH, the degree of substitution σ (moles of substituent per 100 moles of monomer) increased regularly with the time of reaction with regard to the formal group (75.9 and 84.4 after 5 and 25 hrs., resp.), decreased with regard to OH and AcO, reaching equil. after about 25 hrs.; with 82–92% AcOH, σ for AcO falls for the first 5–6 hrs., then increases again; for OH, σ decreases regularly; for the formal group, correspondingly, σ increases during 8 hrs., then decreases slightly (10 hrs.). Increase in the amt. of HCHO above the theoretical (0.5 mole per mole monomer) shifts the equil. in favor of formal; e.g., 60%, AcOH, 15 hrs. HCHO 0.5 and 1.0 moles, σ(formal) 80.2 and 88.2; further increase in HCHO has no further effect. Variation of the amt. of H_2SO_4 (1, 3, 5%) is without effect on σ, owing to the fact that while more dil. H_2SO_4 favors substitution of OH by formal, its hydrolytic action on I is slower, and vice versa. Variation of the temp. (75 and 100°) has no effect on σ of the finished product even though the higher temp. accelerates somewhat the reaction in its initial stages. Higher concn. of AcOH accelerates the reaction considerably; e.g., for 60, 75, 82, and 90%, σ (formal) is 79.3 in 20 hrs., 80.6 in 16 hrs., 84.4 in 6 hrs., 84.0 in 4 hrs. In AcOH stronger than 80%, acetate is being reformed along with formal, the first reaction being catalyzed by H_2SO_4 to a higher degree than the second; consequently, under these conditions, a higher σ for formal is reached without H_2SO_4 than in its presence (80.1 against 85.8, in 16 hrs., 10% I, 0.75 mole HCHO, mole monomer, 0 and 5% H_2SO_4). The amt. of I in the soln. can be increased up to the limit of its soly. in the given concn. of AcOH. The thermostability of the product increases with the no. of formal groups and correspondingly decreasing no. of AcO, at about const. no. of OH. Presence of too high a no. of AcO lowers the temp. of softening. This can be remedied by treating the product with 0.5% NaOH at 90–95°; the product then begins to crumple at about 170–175° and becomes slightly yellowish at 200°. Products with σ = 65 are sol. in CH_3COCH_3; with σ below 78–80 they are sol. in alc.–benzene (1:4), above 80 only in phenol, pyridine, and chlorinated hydrocarbons. N. Thon



Vinyl ester of formic acid. S. N. Ushakov, I. A. Arbuzova, and B. N. Rostovskii. *Zhur. Priklad. Khim.* (J. Applied Chem.) 20, 1013–18(1947).—Conditions have been worked out for the successful catalytic synthesis by $C_2H_2 + HCO_2H \rightarrow HCO_2CH:CH_2$, with max. suppression of side reactions. Purified and dried C_2H_2 mixed with HCO_2H vapor in the ratio C_2H_2 15–17 mols. to HCO_2H 1 mol. was led over the catalyst with a time of contact of 3.0–3.5 sec. The catalyst is $(AcO)_2Zn$ or $(HCO_2)_2Zn$ on activated C of grain size 1–2 mm., granulometric d. 0.81, apparent d. 0.837, true d. 1.88 g./cc., porosity 55.5%, sp. surface area 350 sq. m./g. (by sorption of methylene blue). Under equal conditions, with 10% Zn salt in the catalyst, reaction between C_2H_2 and HCO_2H starts and proceeds at considerably lower temps. than the analogous reaction with AcOH; thus, 65, 75, 85, and 95% conversion of the acid were reached, with HCO_2H at about 162, 168, 173, and 184°, with AcOH at 184, 189, 192, and 198°. The activity of the catalyst increases with increasing amt. of Zn salt, e.g., with HCO_2H, amt. of $(HCO_2)_2Zn$ in the catalyst 9.4, 16.7, and 20%, a degree of conversion of 80% was reached at about 173, 163, and 160°, of 90% at, resp., 178, 160, and 168°. Detns. of the amt. of ester in the condensate, with an 18% Zn salt catalyst, at 180–195°, contact time 3.0–3.5 sec., C_2H_2:HCO_2H = 10:1 (molar), gave, for runs of 19–24, 24–30, and 40–45 hrs., resp., yields of 57, 54.1, and 61.8% of HCO_2H passed, 74, 71, and 81% of HCO_2H spent. In addn. to $HCO_2C_2H_3$ and unreacted HCO_2H, the condensate contains about 5% AcH, evidently due to the side reaction $HCO_2C_2H_3 + HCO_2H \rightarrow 2CO + H_2O + AcH$. Polymerization of $HCO_2C_2H_3$ in a sealed tube in the presence of Bz_2O_2, 1.5 hrs. at 80°, gave 80% of solid product insol. in EtOH, C_6H_6, CCl_4, and EtOAc, sol. in Me_2CO. The polymer formed on long standing, without heating and without Bz_2O_2, was sol. in Me_2CO and $CHCl_3$. viscosity of a 0.2% soln. in Me_2CO 0.3527 centipoise, mol. wt. 71000. This polyvinyl formate is readily saponified in boiling H_2O (96% in 5.5 hrs.), the HCO_2H formed accelerating the reaction; pptn. with Me_2CO sepd. the polyvinyl alc., white powder sol. in H_2O. The $HCO_2C_2H_3$ monomer is readily sapond. with H_2O. This reaction can be utilized to strengthen dil. HCO_2H, with AcH as a by-product. Thus, 25.6 g. of 91.9% $HCO_2C_2H_3$, (HCO_2H 1.6, AcH 7.5%), boiled with 50 g. HCO_2H (89.5%), gave 11.8 g. AcH and 63.8 g. residue, fractionated into b. 95–100°, 100–103°, and 103–105°, contg., resp., 81.7, 90.12, and 92.10% HCO_2H. N. Thoo



Copolymerization of mixtures of vinyl esters with maleates. I. Copolymerization of ethylene glycol maleate with vinyl formate. S. N. Ushakov and S. P. Mitsengendler. *Zhur. Prikład. Khim.* (J. Applied Chem.) 20, 1261-9(1947).—Redistd. ethylene glycol was condensed with an equimol. proportion of redistd. maleic acid according to the method of Kropa and Bradley (*C.A.* 34, 1199[1]) or with a 20% excess of maleic acid according to the method of Rust (*C.A.* 34, 1773[3]). The products were slightly colored resins of mol. wt. 2300-2800 and acid no. 20-25. These polyesters contain glycol maleate ester linkages (I). The polyesters were condensed with vinyl formate (II), with Bz_2O_2 as a catalyst. The concns. studied were 50-330 parts II and 3 parts Bz_2O_2 per thousand of total wt. The mixt. of polyester and II was held at 45° for 30-45 min. to obtain soln. Bz_2O_2 was added and after 10-15 min. the soln. was warmed to 56° and allowed to polymerize for 10-18 hrs. The resulting copolymerizate (III) was freed from II polymer and unreacted polyester resin by long extn. with acetone in a Soxhlet flask. The percentage copolymerization was 98-97% for II: polyester ratios of 1:1 to 2:2.6 but decreased to 91% and 80% for ratios of 1:5 and 1:10, resp. Analysis for formate groups in III showed copolymerization to be the controlling reaction, since even with the max. concn. of II all the II was combined with the polyester. The product III was a three-dimensional polymer in which the basic structural unit was $-OCH_2CH_2OOCCHCH_2COOCH-$. A modified

$$\begin{array}{l} \text{CH}- \\ \text{COO}- \end{array}$$

copolymer was made by sapong. the formate groups to form a polyester-vinyl alc. condensation product. Sapon. in even weak alk. solns. was undesirable because the I were broken under these conditions. III and H_2O were heated on a water bath with vigorous agitation to accomplish the sapon. The aq. phase was replaced with fresh H_2O every 12-15 hrs. to avoid the formation of sufficient acidity to cause hydrolysis of the I. The amt. of acid liberated was a linear function of time up to 70 hrs. No maleic acid was detected in the hydrolyzate after 27 hrs. After 50 hrs., 72% of the formate groups had been hydrolyzed to yield HCOOH and 11% of the I groups had been hydrolyzed to yield maleic acid. At 70 hrs. the percentage of formate groups hydrolyzed reached the max. value of 82%. Thereafter hydrolysis occurred at the I exclusively and increased from 20% to 30% as the sapon. time increased from 70 to 90 hrs. Thus, splitting of I occurred more readily as the hydrophile nature of the polymer was increased by replacing the formate groups with hydroxyls.

H. K. Livingston

PA 47/49T16

USSR/Chemistry - Plastics
Chemistry - Vinyl Alcohol

Nov 48

"Esterification of Polyvinyl Alcohol by Means of Dibasic Aliphatic Acids," S. N. Ushakov, R. K. Gavurina, P. A. Medvedeva, Chair of Plastics Technol, Leningrad Tech Inst, 8 pp

"Zhur Prikład Khim" Vol XXI, No 11, 1118

Shows that in the reaction of polyvinyl alcohol with chloroanhydride and polymer of adipic acid anhydride in pyridine, esters with varying degrees of esterization, depending on relation of original components, are formed.

47/49T16

USSR/Chemistry - Plastics (Contd) Nov 48

Insoluble products are formed if more than 0.1 mole of chloroanhydride or adipic acid anhydride is added per mole of polyvinyl alcohol. If the reaction is conducted in a medium of concentrated acetic acid mixed complex esters, polyvinyl acetate adipates are derived. Shows that conditions of esterification of polyvinyl alcohol by succinic acid anhydrides are analogous to those of esterification by adipic acid anhydride. Submitted 1 Apr 48.

47/49T16

USHAKOV, S. N.

USHAKOV, S. N.

Ushakov, S. N., Gavurina, R. K. and Riadinskaia, N. M., On the homogeneity of the composition of polyvinylbutyrales obtained by methods of the homogeneous and heterogeneous acetalation. P. 1126.

The degree of physical and chemical homogeneity of polyvinylbutyrales, obtained by the homogenous and the heterogeneous methods of synthesis is approximately the same.

Chair of Technology of Plastic Masses
Leningrad Technological Institute.
April 1, 1948.

SO: Journal of Applied Chemistry (USSR) 21, No. 11 (1948)

USHAKOV, S. N.

Ushakov, S. N., Gavurina, R. K. and Tsubina, Kh. V. "On the dehydration of polyvinyl alcohol," In the Symposium: Investigations in the field of complex-molecular compounds, Moscow-Leningrad, 1949, p. 182-92, - Bibliog: 5 items

So: U-5241, 17 December 1953, (Letopis 'Zhurnal 'nykh Statey, No. 26, 1949)

CA

31

Inst. Org. Chem., AS

Copolymerization of allyl alcohol and its derivatives with sulfur dioxide. S. N. Ushakov, I. A. Arbuzova, and V. N. Vlerneva. *Izvest. Akad. Nauk S.S.S.R., Otdel Khim Nauk* 1949, 551-6.—Copolymerization of allyl alc. with SO_2 at 0-3° in the presence of 0-0.2% $AgNO_3$ in EtOH was investigated; the product, colorless amorphous solid after washing with Et_2O and EtOH contained 25.65-26% S; in a 48-hr. reaction with 1:2 molar ratio at 15° with 0.2% catalyst, the yield rises rapidly from 30% in 18 hrs. to over 80% in 30 hrs. and is almost 100% in 48 hrs.; the temp.-yield curve is linear; the effectiveness of the catalyst is displayed almost identically in 0.05-0.2% concns., but lower amts. give sharply decreased yields; increase of SO_2 ratio to 6 gives a 97.8% yield, against 89.7% in a 9-day polymerization at 0° with 0.02% catalyst. The polysulfone products are unstable to hot aq. alkalies (even 2%), swell in water, and hydrolyze slowly on boiling; they are sol. only in pyridine and can be repptd. from solns. in strong mineral acids without change. Viscosities of 0.2% samples made with 0.003-0.04% catalyst were closely grouped at 1.153-1.236 centipoises and essentially no fractionation was achieved by stepwise pptn. from sirupy H_3PO_4 by H_2O (as dil. H_3PO_4). Treatment of the product with paraformaldehyde (0.73-1.0 g. per 2 g. polymer) in concd. HCl at 35-40° for 4 hrs. gave an amorphous ppt., after the gelation stage, which contained 70-2% formal group substitution; the products are insol. in all org. solvents and slowly dissolve in HCl with loss of CH_2O. Similar copolymerization of diallyl formal and diallyl acetal with SO_2, with $AgNO_3$ catalyst (dissolved in allyl acetate) for 3 hrs. to 3 days (without catalyst), gave 38% copolymer with the formal and 43-9% polymer with the acetal when $AgNO_3$ was used (12% without catalyst in 3 days); the acetal formed the copolymer vigorously even at −15°, but the action slows down very rapidly; the products (empirical formula for the formal being $C_7H_{12}S_2O_5$ and for acetal $C_8H_{14}S_2O_5$) are insol. in org. solvents and are sol. slowly in HCl with aldehyde evolution. G. M. K.

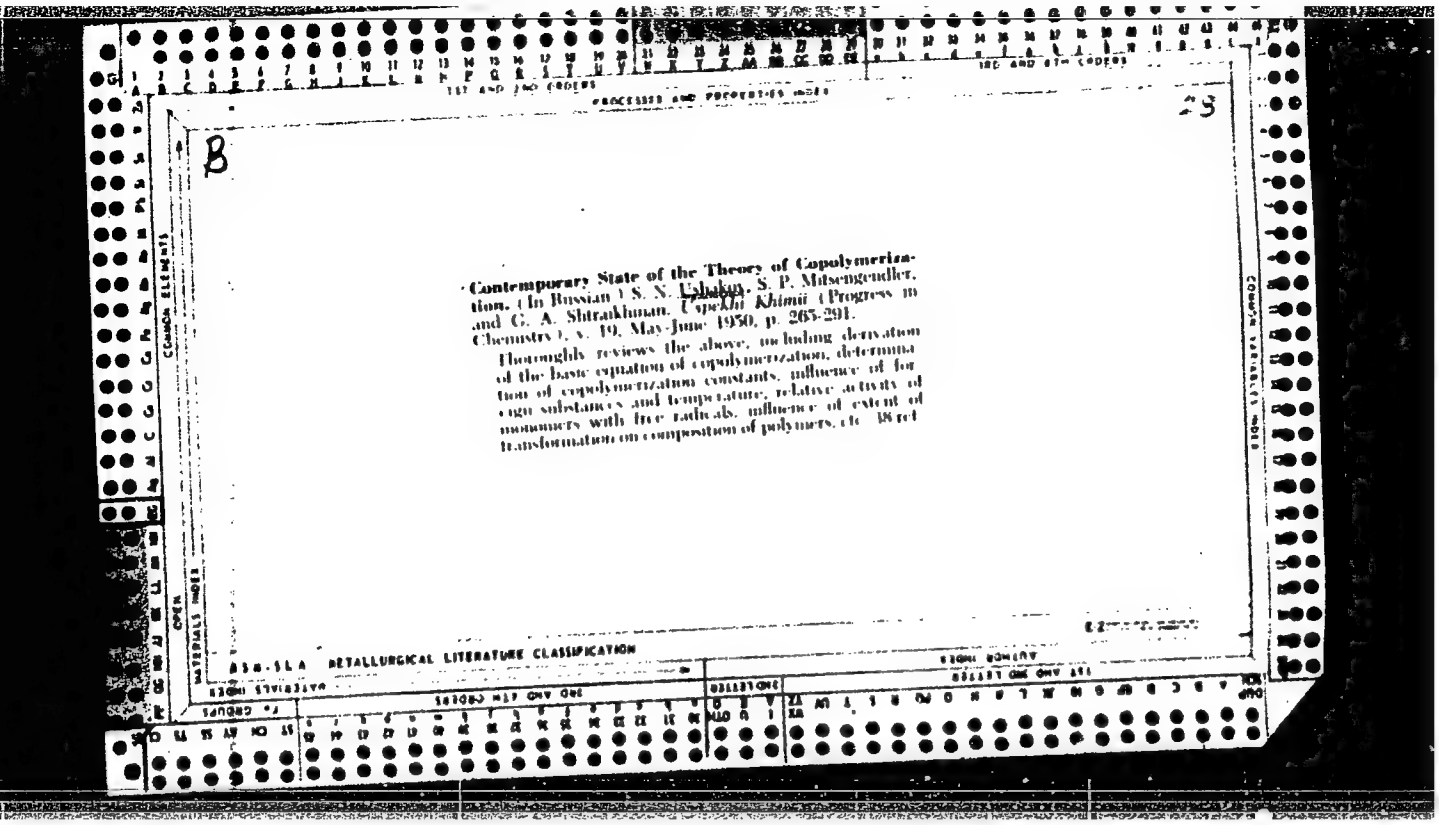
CA

10

Synthesis of vinyl ethers of polyvinyl alcohol S. V. Shakov and S. I. Kirillova *Zhur. Prikład. Khim* (J. Applied Chem.) 22, 1004 (1949) (Russian). *Vinylation of polyvinyl alc.* is best done in aq. alk. soln. at 12–18 atm of C_2H_2 at 100–15°. At 120–30° the main reaction is more of hydration of the ale. After 10–20 hrs' reaction there are formed products, sol. in H_2O, MeOH, and 80% EtOH, which contain 3.5–6.0 mol.-% vinyl groups. The yields range from 50 to 70%. The products are yellowish to brown solids; lighter products are secured by using 8% KOH with addn. of NH_4OH and ZnO; Et_3N or quinaldine gave poor results leading to insol. products. The detn. of the vinyl groups was done by detn. of AcH following hydrolysis with dil. H_2SO_4.

G. M. Kosolapoff

Synthesis of *m*-iodostyrene. S. S. Ushakov and P. S. Predtechenskaya (Polymer. Plastics Inst., Leningrad). *Izvest. Akad. Nauk S.S.S.R., Otdel. Khim. Nauk* 1950, 208-76. - Addn. of 100 g. BzH to 110 g. KNO_3 in 325 g. concd. H_2SO_4 at 5° over 4-5 hrs. and dilu. with H_2O gives 40-41% *m*-$O_2NC_6H_4CHO$, m. 54°, along with some 25% *o*-isomer which remains in the mother liquor. At 25-35° the yield of *m*-isomer is raised to 75-85%. Addn. of the product with stirring to $SnCl_2$ in HCl with cooling (spontaneous rise of temp. to 60-80° occurs in spite of cooling), followed by diazotization at 2° with $NaNO_2$, addn. of KI soln. at 5°, letting stand 12 hrs., and heating 1 hr. to 80-90° gave *m*-IC_6H_4CHO. The use of a very high proportion of HCl (40 mols.) gives poorer results (15-20% yield) than 8 moles HCl (theoretical amt.), which gave 28% or 10-11 moles HCl (38-41% yield); the product, isolated by steam distn., m. 56-7°. The reaction of this with MeMgI conducted as usual in Et_2O gave 70% *m*-$IC_6H_4CH(OH)Me$, b$_5$ 119-20°, d_4^{20} 1.707, n_D^{20} 1.6215. Dehydration of this by passage over Al_2O_3 at 300° proceeds well for 15-20 min. with formation of 98% pure product, after which period decompn. begins and iodine is evolved; the same occurs at 260-70°. Distn. of the carbinol with $KHSO_4$ in the presence of hydroquinone (0.1-0.2%) at 190-200° and 50-60 mm. in a CO_2 atm. gave a 71-4% yield with 13-14% (by wt.) of $KHSO_4$; a smaller ratio of $KHSO_4$ gave lower yields. The pure *m*-$IC_6H_4CH{:}CH_2$, b$_5$ 68-71°, b$_3$ 71-3°, d_4^{20} 1.674, n_D^{20} 1.6390, polymerizes with 0.1% Bz_2O_2 in 1-2 hrs. at 80-100° to a clear solid polymer, d_4^{20} 1.80, n_D^{20} 1.6850 (highest among org. polymers). G. M. Kosolapoff

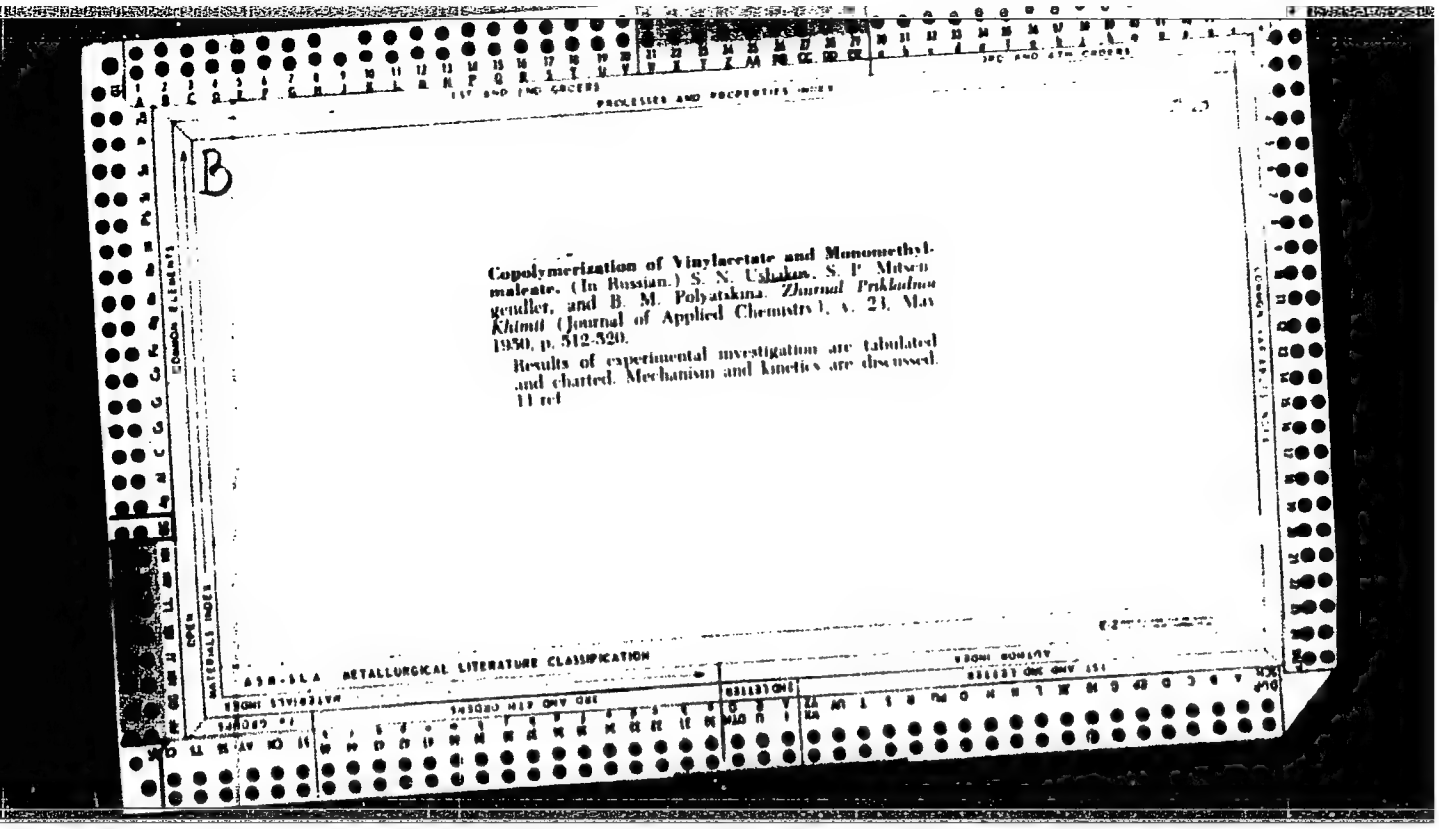


B

Contemporary State of the Theory of Copolymerization. (In Russian.) S. N. Ushakov, S. P. Mitsengendler, and G. A. Shtrakhman. *Uspekhi Khimii* (Progress in Chemistry), v. 19, May-June 1950, p. 265-291.

Thoroughly reviews the above, including derivation of the basic equation of copolymerization, determination of copolymerization constants, influence of foreign substances and temperature, relative activity of monomers with free radicals, influence of extent of transformation on composition of polymers, etc. 48 ref

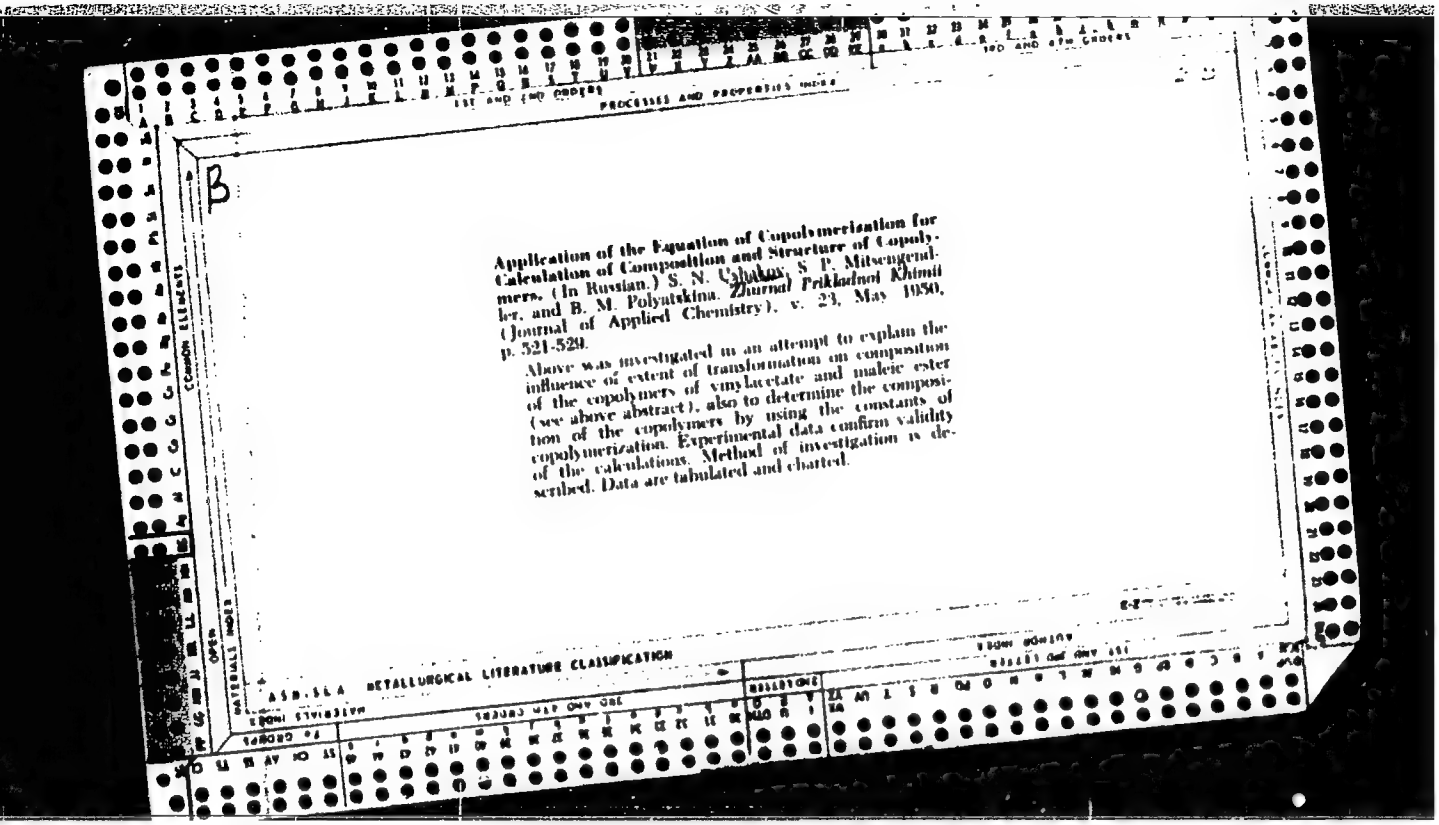
METALLURGICAL LITERATURE CLASSIFICATION



B

Copolymerization of Vinylacetate and Monomethylmaleate. (In Russian.) S. N. Ushakov, S. P. Mitsengendler, and B. M. Polyatskina. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, May 1950, p. 512-520.

Results of experimental investigation are tabulated and charted. Mechanism and kinetics are discussed. 11 ref



B

Application of the Equation of Copolymerization for Calculation of Composition and Structure of Copolymers. (In Russian.) S. N. Ushakov, S. P. Mitsengendler, and B. M. Polyatskina. *Zhurnal Prikladnoi Khimii* (Journal of Applied Chemistry), v. 23, May 1950, p. 521-529.

Above was investigated in an attempt to explain the influence of extent of translormation on composition of the copolymers of vinylacetate and maleic ester (see above abstract), also to determine the composition of the copolymers by using the constants of copolymerization. Experimental data confirm validity of the calculations. Method of investigation is described. Data are tabulated and charted.

ASB-SLA METALLURGICAL LITERATURE CLASSIFICATION

USHAKOV, S. N.

177T28

USSR/Chemistry - Synthetic Resins and Elastomers Mar 51

"Effect of Solvents and Temperature on the Copolymerization Constants of Vinylacetate and Monomethylmaleate," S. N. Ushakov, S. P. Mitsengendler, B. M. Polyatskina, Chair of Plastics, Leningrad Tech Inst imeni Lensovet

"Zhur Prik Khim" Vol XXIV, No 3, pp 289-295

Exmd effects of solvents and temp on const o and μ of copolymerization of vinylacetate and monomethylmaleate. Found no change of const in presence of

177T28

USSR/Chemistry - Synthetic Resins and Elastomers (Contd) Mar 51

solvents. As to temp, found both const approximately doubled between 56 and 78°C, but temp actually had small effect on compn of copolymers.

177T28

CA

31

The effect of solvents and temperature on the copolymerization constants of vinyl acetate and monomethyl maleate. V. S. Ushakov, S. P. Mitsengendler, and B. M. Polyatskina (Lensoviet Technol. Inst., Leningrad). *J. Applied Chem. U.S.S.R.* 24, 319–25(1951)(Engl. translation).—See *C.A.* 40, 774c. R. M. S.

1952

USHAKOV, S. N.

183T36

USSR/Chemistry - Plastics May 51

"Copolymerization of Vinyl Acetate and Maleic Anhydride and the Properties of the Copolymers Obtained," S. N. Ushakov, S. P. Mitsengendler, V. A. Chekhovskaya, Chair of Plastics, Leningrad Tech Inst

"Zhur Prik Khim" Vol XXIV, No 5, pp 485-489

Same relationships are observed in copolymerization of vinyl acetate with maleic anhydride as in the case of vinyl acetate and monomethyl maleate. Maleic anhydride, like its ester, can

183T36

USSR/Chemistry - Plastics (Contd) May 51

combine with itself in presence of complex vinyl esters to yield copolymers contd higher than 50% maleic component. Obtained copolymers are easily sapond with H_2O to form high-mol compds with side rings on chain (lactones).

183T36

USHAKOV, S.N.; MITSENGENDLER, S.P.; POLYATSKINA, B.M.

Application of newer methods of study to copolymerization of vinyl acetate with the maleates. Khim. i Fiz. Khim.Vysokomolekul. Soedineniy , Doklady 7-oy Konf. Vysokomolekul. Soedineniyam '52, 19-27. (MLRA 5:7) (CA 47 no.15:7820 '53)

USHAKOV, S. N.

USSR/Chemistry - Plastics Jan 52

"Hydroxyallyl Ethers of Cellulose and Their Co-polymerization With Sulfurous Anhydride," S. N. Ushakov, O. M. Klimova

"Zhur Prik Khim" Vol XXVI, No 1, pp 46-56

Uniform low-mol allyl ethers of cellulose were synthesized by homogeneous medium method in following manner. Hydroxyethyl ether of cellulose (I) (sol in aq alkali solns of 18-20% concn) was prepd. I reacted with allylbromide in different proportions to yield hydroxyethylallyl ethers of cellulose (III) with different degs of substitution. Under

206T41

USSR/Chemistry - Plastics (Contd) Jan 52

exposure to air III was oxidized into insol product (IV). Polymerization of III under action of benzoyl peroxide and heat stopped at stage of gel-formation, due to spatial hindrances.

206T41

USHAKOV, S.N.

B. T. R.
Vol. 3 No. 4
Apr. 1954
Chemistry-Organic

3.
(2) Chem

4617* Alkali Derivatives of Polyvinyl Alcohol. (Russian.) S. N. Ushakov and E. M. Lavrent'eva. *Zhurnal Prikladnoi Khimii*, v. 26, no. 9, Sept. 1953, p. 960-968.

Describes action of aqueous solutions of caustic soda. Product is analogous to the alkali derivative of cellulose. Tables, graph, photograph. 7 ref.

MF
7-28-54

USHAKOV, S. N.

USSR/Chemistry Synthesis processes

Card : 1/1 Pub. 40- 18/27

Authors : Ushakov, S. N., and Solomon, O. F.

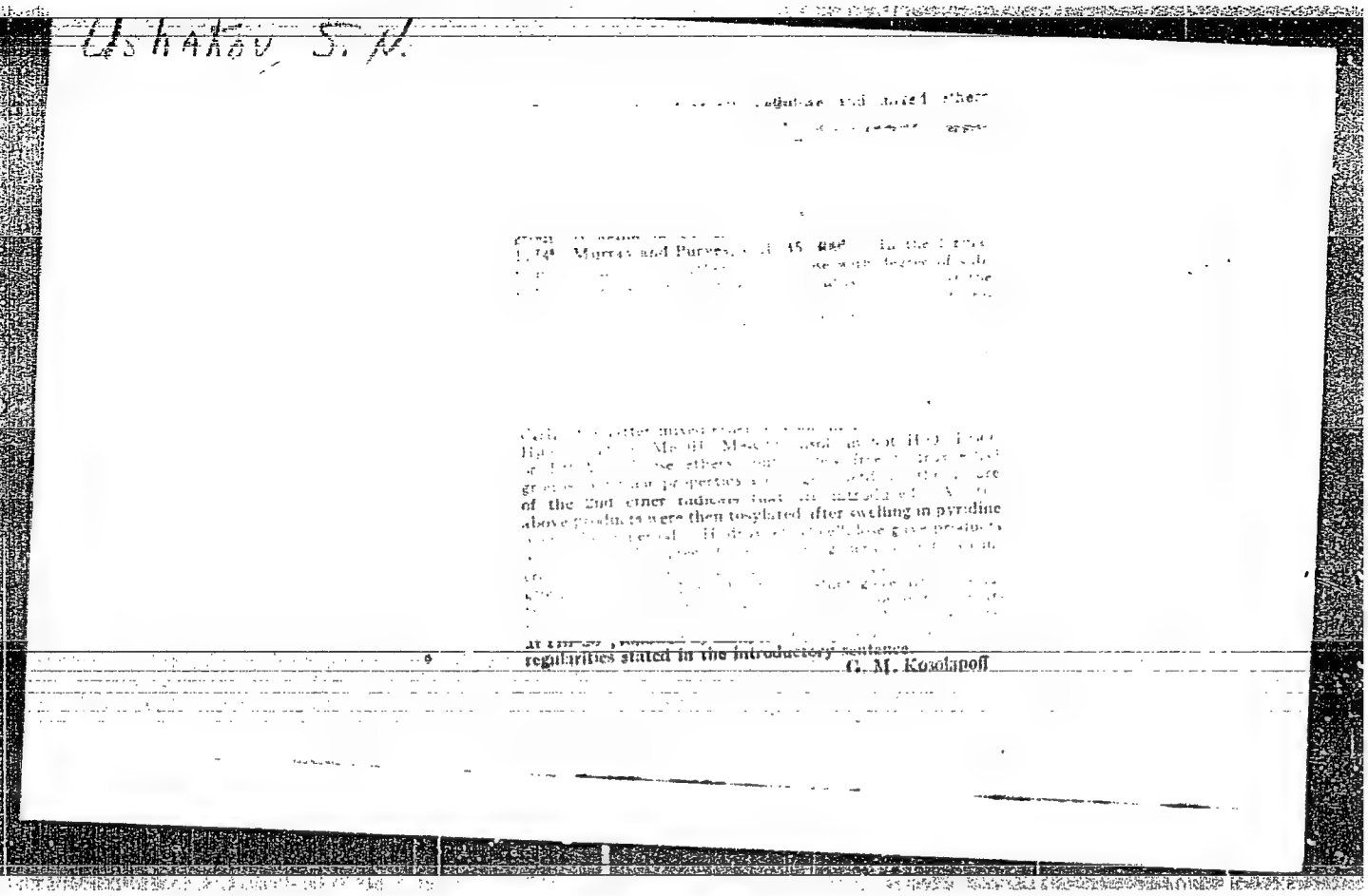
Title : About the synthesis of cyclooctatetraene

Periodical : Izv. AN SSSR. Otd. khim. nauk 4, 694 - 706, July - August 1954

Abstract : The effect of various factors on the polymerization reaction of acetylene yield and rate of formation of cyclooctatetraene during the process of catalytic polymerization of acetylene under pressure, was investigated. Polymerization of acetylene into cyclooctatetraene offers best results in the absence of ethylene oxide and calcium carbide. Water traces and some unidentified foreign admixtures contained in the catalyst, were found to be the only inhibitors of the polymerization reaction. The effect of pressure in the reaction vessel on the yield of cyclooctatetraene, is explained. Twenty-four references: 1 USSR; 10 German; 2 English; 11 USA (1911 - 1952). Tables; graphs.

Institution : The Lensoviet Technological Institute, Leningrad

Submitted : July 6, 1953



Eshaev, S. M.

of the 2nd ether radicals [illegible] above products were then tosylated after swelling in pyridine

regularities stated in the introductory sentence.

G. M. Kosolapoff

USHAKOV, S.N.

USSR/ Chemistry - Synthetics

Card 1/1 Pub. 40 - 15/2

Authors : Ushakov, S. N., and Kononova, T. A.

Title : Synthesis of polyvinyl alcohol esters

Periodical : Izv. AN SSSR. Otd. khim. nauk 1, 117-125, Jan-Feb 1955

Abstract : Experimental data are given on the development and improvement of methods for the synthesis of polyvinyl alcohol esters (polyvinylformate, polyvinyl acetate, polyvinylpropionate, polyvinylbutyrate and polyvinylisobutyrate) containing various amounts of free hydroxyl groups and having uniform average length of the macromolecular chain and polydispersion. The results obtained with the aid of the new methods are described. Thirteen references: 4 USSR, 4 German, 2 USA and 3 English (1926-1949). Tables; graph.

Institution : The Lensoviet Technological Inst. Leningrad

Submitted : April 23, 1954

USHAKOV, S. N.

USSR/ Chemistry - Chemical technology

Card 1/1 Pub. 40 - 19/26

Authors : Ushakov, S. N., and Kononova, T. A.

Title : About certain physico-chemical properties of polyvinyl alcohol esters

Periodical : Izv. AN SSSR. Otd. khim. nauk 2, 335 - 343, Mar-Apr 1955

Abstract : Tests were made to determine the vitrification temperatures and mechanical properties of complete polyvinyl alcohol esters and formic, propionic, n-butyric and isobutyric acids and a series of products obtained through their partial saponification. The vitrification points were found to be constant up to a free hydroxyl content of 30 mol/%; they increase in proportion to the drop in ester group content. The anomalous change in the vitrification point of formic esters of polyvinyl alcohol is explained. The strength, modulus and elongation of polyvinyl alcohol ester films were determined in vitreous and high-elastic states. Nine references: 8 USSR and 1 German (1939-1955). Tables; diagrams.

Institution : The Leningrad Soviet Technological Institute, Leningrad

Submitted : April 23, 1954

USHAKOV, S. N.

USSR/ Chemistry - Polymerization

Card 1/1 Pub. 40 - 15/25

Authors : Ushakov, S. N., and Nikolayev, A. F.

Title : Polymerization and copolymerization of N-vinyl compounds. Part 1. Copolymerization of vinyl carbazole with vinyl esters

Periodical : Izv. AN SSSR. Otd. khim. nauk 1, 83-91, Jan 1956

Abstract : New hitherto unknown vinyl carbazole and vinyl ester copolymers of organic acids (formic, acetic, propionic and butyric) obtained through mass polymerization are described. The causes for the reduction in the rate of vinyl ester copolymerization followed by an increase in the length of the acid residue chain of vinyl ether are explained. The copolymerization constants were established for several vinyl base compounds and the differential and integral compositions of the vinylcarbazole copolymers were estimated. Thirty-six references: 17 USA, 6 USSR, 2 Germ., 1 French and 10 Eng. (1937-1953). Tables; graphs.

Institution : Leningrad Technological Institute im. Leningrad Soviet

Submitted : March 10, 1955

USHAKOV, S.N

USSR/Chemistry of High-Molecular Substances, F

Abst Journal: Referat Zhur - Khimiya, No 19, 1956, 61745

Author: Ushakov, S. N., Nikolayev, A. F.

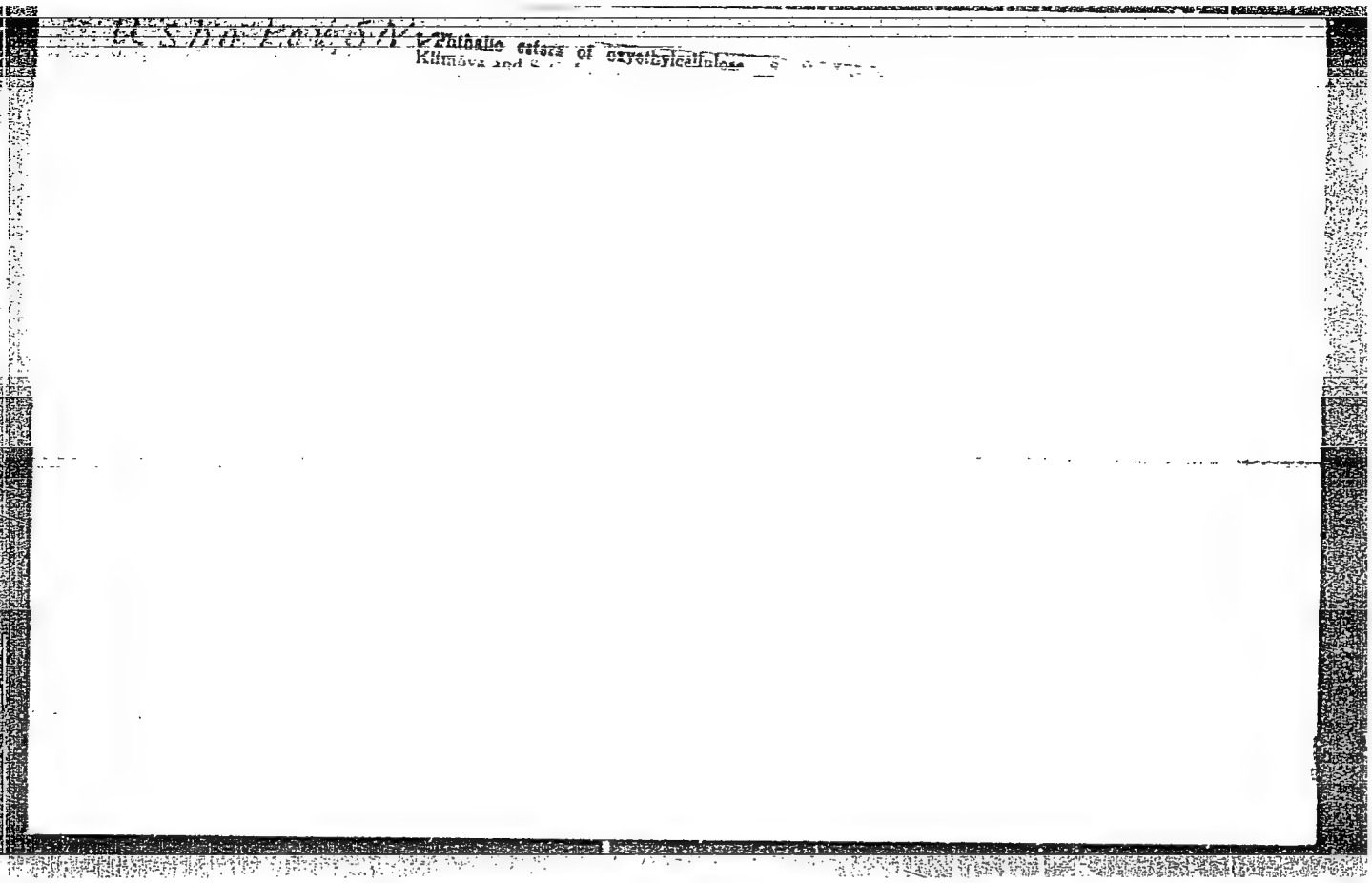
Institution: None

Title: Polymerization and Copolymerization of N-vinyl Compounds. Communication 2. On Some Characteristics of the Reaction of Copolymerization of Vinyl Acetate and Vinyl Carbazole and the Properties of the Copolymers

Original Periodical: Izv. AN SSSR, otd. khim. n., 1956, No 2, 226-231

Abstract: Rate of copolymerization of vinyl carbazole (I) and vinyl acetate (II) (temperature 80° and 100°, initiator benzoyl peroxide) passes through a minimum at a concentration of I of 10-20 mol %. At 65° and a 10-35% concentration of I polymerization does not take place. Rate of copolymerization of I and II is proportional to the square root of the concnetration of the initiator and the higher the concentration of I in the mixture the higher is the rate of

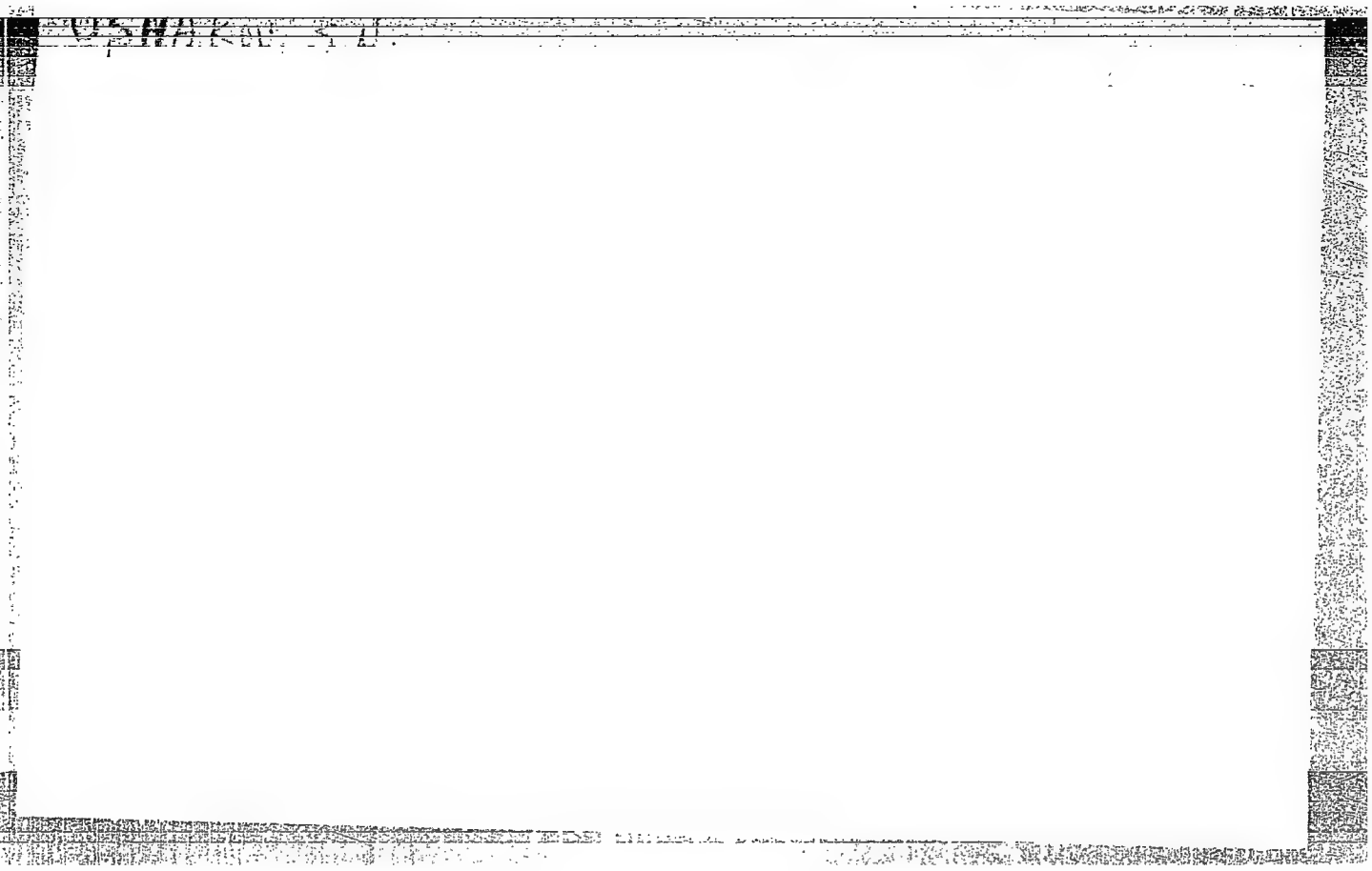
Card 1/2



USHAKOV, S. N., and LAVRENT'YEVA, Z. M.

"A few new polymers derived from polyvinylalchol," a paper presented at the 9th Congress on the Chemistry and Physics of High Polymers, 28 Jan-2 Feb 57, Moscow, Polymer Research Inst.

B-3,084,395



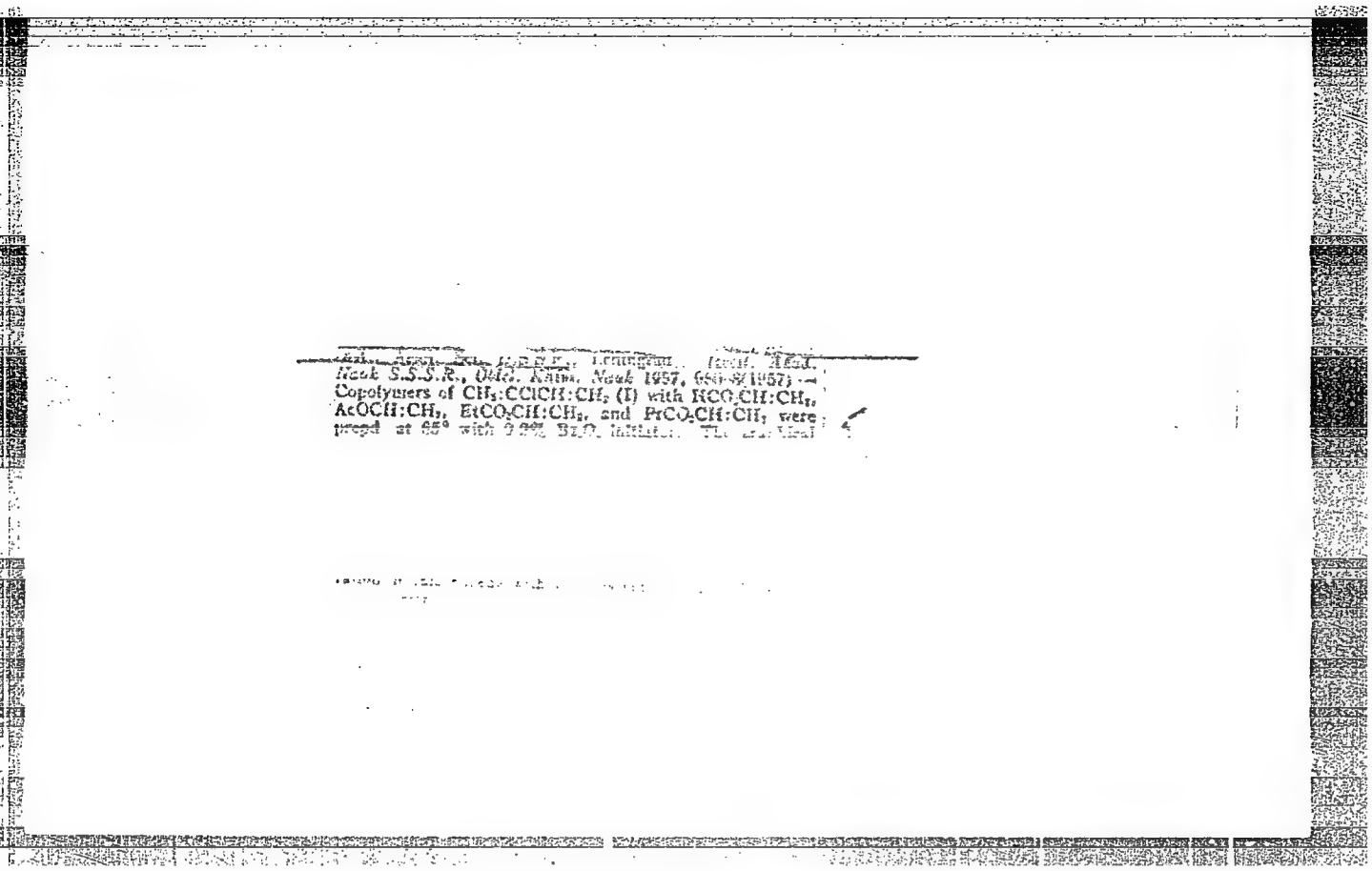
APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001858120016-9"

without CCl_4 in the system. The action of CCl_4 is sup-

USHAKOV, S.N.; MITSENGENDLER, S.P.; KRASULINA, V.N.

Copolymerization of diethylene hydrocarbons with vinylalkyl ethers. Report No.2: Copolymerization of divinyl with vinylalkyl ethers in emulsion at low temperatures. Izv.AN SSSR Otd.khim.nauk no.4:490-493 Ap '57. (MIRA 10:11)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.
(Polymerization) (Ethers)



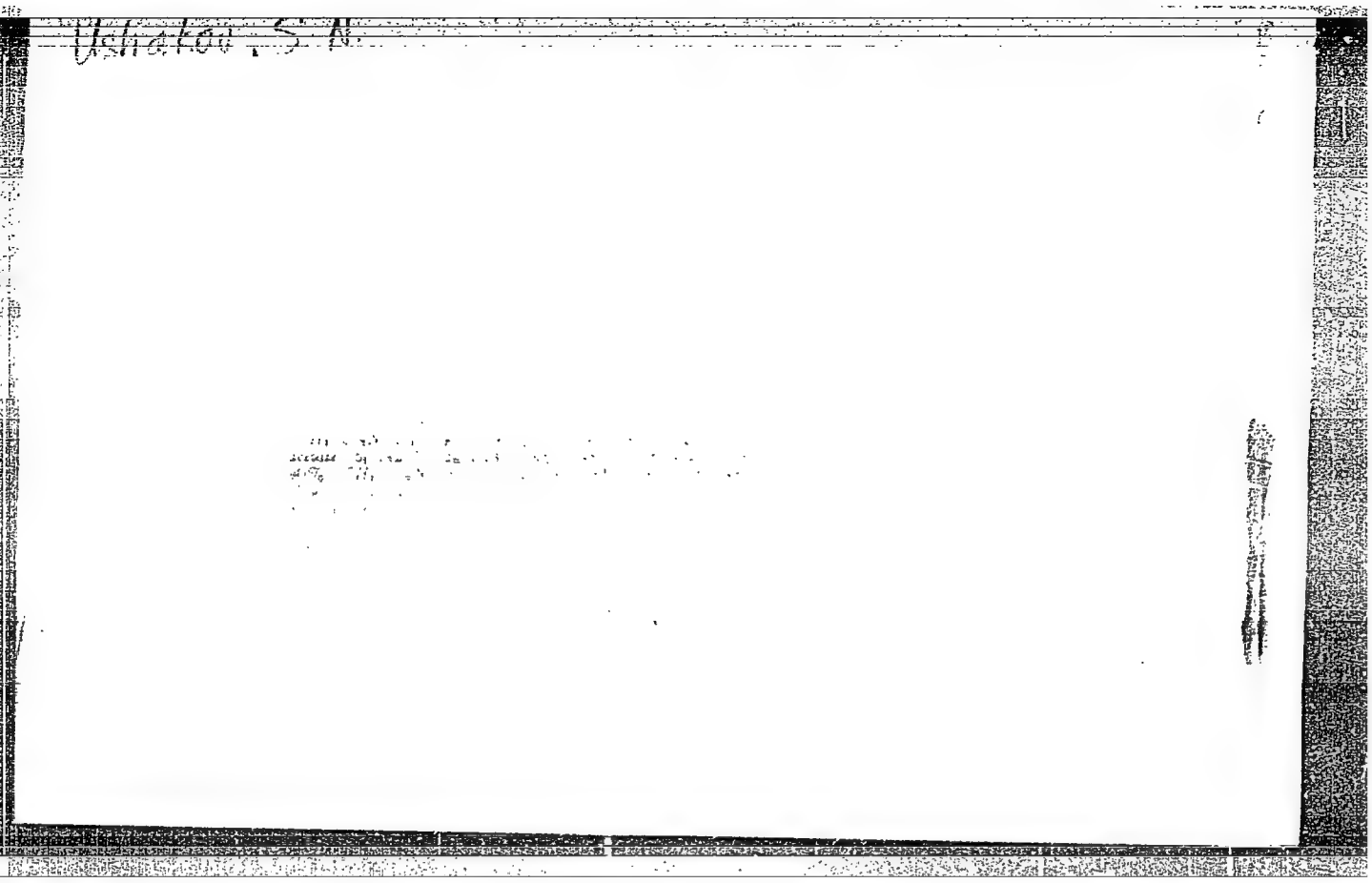
Copolymers of $CH_2{:}CClCH{:}CH_2$ (I) with $HCO_2CH{:}CH_2$, $AcOCH{:}CH_2$, $EtCO_2CH{:}CH_2$, and $PrCO_2CH{:}CH_2$ were prepd at 65° with 0.8% Bz_2O_2 initiator.

USHAKOV, S.N.

USHAKOV, S.N.; TSUKHMANOVA, L.B.

Copolymerization of chloroprene and vinyl esters. Report No.2: "Copolymerization Limit" and rates of reactions during the copolymerization of chloroprene with vinyl esters. Izv. AN SSSR. Otd. khim. nauk no.9:1072-1079 S '57. (MIRA 10:12)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR.
(Polymerization) (Chloroprene) (Vinyl alcohol)



52-12-6/20

AUTHORS: Ushakov, S.N., Ivanov, S.S.

TITLE: On the Co-Polymerization of Divinyl With Vinyl Formiate (O sopolimerizatsii divinila s vinilformiatom).

PERIODICAL: Izvestiya AN SSSR Otdeleniye Khimicheskikh Nauk, 1957, Nr 12, pp. 1465-1471 (USSR)

ABSTRACT: The co-polymerization of divinyl with complicated vinyl ethers is of interest because of the possibility thus arising of modifying the properties of vinyl polymers. Because of the low velocities of co-polymerization reaction in the medium of hydrocarbon, and in view of the possibility of hydrolysis in emulsion, it has hitherto been considered impossible to obtain divinyl co-polymers with complicated vinyl ethers. In this paper the authors speak about co-polymerization, which has hitherto not been described in publications dealing with this field. The conditions of the co-polymerization of these monomers in the mass in the presence of the oxidation regeneration system (okislitel'novosstanovitel'naya sistema) is described. The influence exercised by the nature of the radical (bound to iron) upon the velocity of co-polymerization and the yield of co-polymers was described. The use of iron stearate (instead of naphtenate) increases the degree

Card 1/2

62-12-6/20

On the Co-Polymerization of Divinyl With Vinyl Formiate

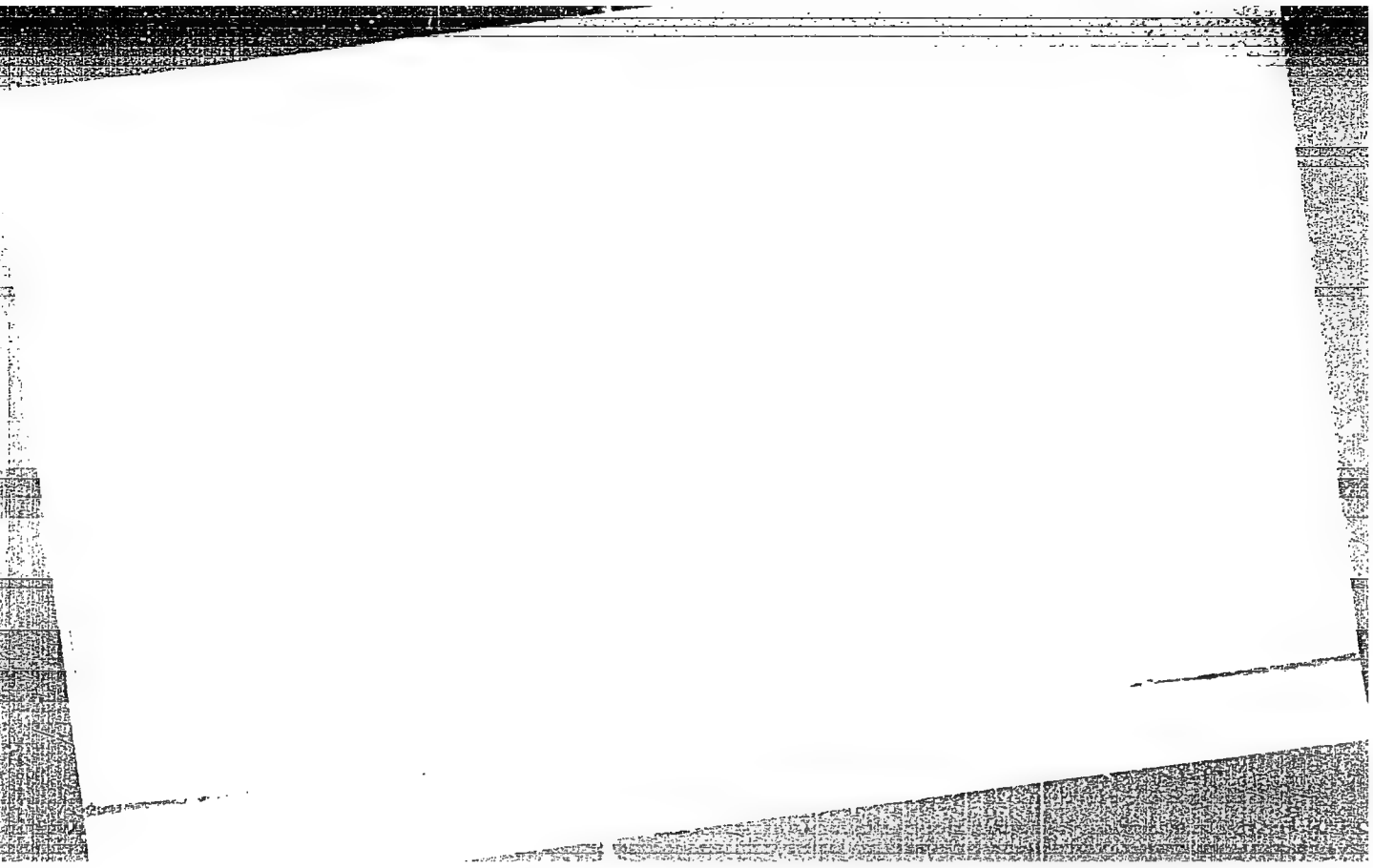
of conversion nearly five-fold. In the fractionation of the co-polymer the fractions are distinguished by their molecular weight and not by their chemical structure. Furthermore, the possibility of the saponification of the formyl groups of the co-polymer was found to exist, and the influence exercised by the free hydroxyl groups upon some properties of the polymers obtained is described. Finally, the constants of the co-polymerization of divinyl with vinyl formiate was uniquely determined. There are 6 tables, and 15 references, 9 of which are Slavic.

ASSOCIATION: Institute for High-Molecular Compounds AN USSR (Institut vysokomolekulyarnykh soyedineniy Akademii nauk SSSR).

SUBMITTED: July 9. 1956

AVAILABLE: Library of Congress

Card 2/2 1. Divinyl-Co-Polymerization 2. Vinyl-Co-Polymerization



APPROVED FOR RELEASE: 03/14/2001 CIA-RDP86-00513R001858120016-9"

USHAKOV S. N.

62-1-10/29

AUTHORS: Rostovskiy, Ye. N., Ushakov, S. N., Barinova, A.N.

TITLE: On the Properties of a Series of Complex Vinyl Ethers (O svoystvakh ryada slozhnykh vinilovykh efirov) Report 1: On the Polymerization and Velocity of the Saponification of the Monomers (Soobshcheniye 1. O polimerizatsii i skorosti omyleniya monomerov)

PERIODICAL: Izvestiya AN SSSR Otdeleniye Khimicheskikh Nauk, 1958, Nr 1, pp 59 - 63 (USSR)

ABSTRACT: In the hitherto published reports one was restrcited to mainly the data about the boiling temperatures and some other physical constants of the monomers. Only in some papers (ref. 1,3,4) the properties of the polymers of complex vinyl ethers were investigated more precisely. The present report deals with the kinetics of the polymerization of a series of complex vinyl ethers, as well as with the detection of their saponification velocity, and with the temperatures of the vitrification of polymers (tables 1,2). The polymerization in the mass as well as the velocity of the saponification of several complex vinyl ethers, and the temperature of the vitrification of polymers were investigated. Furthermore the structure of the azylradicals and their influence on the initial velocity of the polymerization and kinetics of

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62-1-10/21

On the Properties of a Series of Complex Vinyl Ethers
Report 1: On the Polymerization and Velocity of the Saponification of the Monomers

the hydrolysis of these ethers were precisely detected. It was also explained that the influence of the size and the structure of the accessory groups of the polymers on the temperatures of the vitrification has a similar character in the series of complex vinyl ethers, acrylates, and metacrylates. There are 2 figures, 2 tables, 25 references, 11 of which are Slavic.

ASSOCIATION: Institute of High-Molecular Compounds, AS USSR (Institut vysokomolekulyarnykh soyedineniy Akademii nauk SSSR).

SUBMITTED: August 25, 1956

AVAILABLE: Library of Congress

1. Comples vinyl ethers-Properties 2. Complex vinyl ethers-Polymerization 3. Complex vinyl ethers-Saponification-Velocity

Card 2/2

SOV/62-58-8-9/22

AUTHORS: Nikolayev, A. F., Ushakov, S. N., Rozenberg, M. E.

TITLE: Polymerization and Co-Polymerization of n-Vinyl Compounds (Polimerizatsiya i sopolimerizatsiya n-vinil'nykh soyedineniy) Note 4: The Polymerization of Vinyl Phthalimide (Soobshcheniye 4. Polimerizatsiya vinilftalimida)

PERIODICAL: Izvestiya Akademii nauk SSSR, Otdeleniye khimicheskikh nauk, 1958, Nr 8, pp. 968-972 (USSR)

ABSTRACT: In publications there exist few reports on the polymerization of vinyl phthalimide. In the introduction the first experiments and the preliminary work for the production of polyvinyl phthalimide and vinyl phthalimide are discussed in short. (Refs 1-4). In the present paper the authors describe the polymerization of vinyl phthalimide (in block and in the solvent). Also data on the properties of the polymer are given. The dependence of the polymerization rate of vinyl phthalimide and of the molecular weight of the polymer on the conditions of the polymerization in the presence of benzoyl peroxide and azodiisobutyro nitrile were characterized. It was found that powdery polyvinyl phthalimide produced in the polymerization

Card 1/2

Polymerization and Co-Polymerization of n-Vinyl Compounds. Note 4: The Polymerization of Vinyl Phthalimide

of the monomer in benzene is also suited for the further processing. The polymer obtained has enough hardness and heat resistance, and is soluble to a limited extent in organic substances. There are 3 figures, 5 tables, and 12 references, 3 of which are Soviet.

ASSOCIATION: Leningradskiy tekhnologicheskiy institut im. Lensoveta (Leningrad Technological Institute imeni Lensovet)

SUBMITTED: January 11, 1957

Card 2/2

USHAKOV, S.N., zasluzhennyy deyatel' nauki i tekhniki RSFSR, prof.;
LAVRENT'YEVA, Ye.M., mladshiy nauchnyy sotrudnik.

Growth of synthetic fiber production. Tekst. prom. 18 no.3:51-52 Mr '58. (MIRA 11:3)

1. Chlen-korrespondent Akademii nauk SSSR (for Ushakov)
(Textile fibers, Synthetic)

79-28-5-33/69

AUTHORS: Arbuzova, I. A., Ushakov, S. N., Plotkina, S. A., Yefremova, V. N., Ulezlo, I. K.

TITLE: On the Conversion Reactions of Methylolmetacrylamide (O reaktsiyakh prevrashcheniya metilolmetakrilamida)

PERIODICAL: Zhurnal Obshchey Khimii, 1958, Vol 28, Nr 5, pp. 1266 - 1269 (USSR)

ABSTRACT: In carrying out one of the experiments for the synthesis of methylolmetacrylamide according to Feuer, Lynch (Fayer i Linch) (Reference 1) the authors separated, besides this compound, also a product with the melting point 80.5 - 81,5°C which, until now, has not been identified as dimetacrylamidodimethylether. Many experiments to isolate this product from the mixture of final products of the above synthesis did not succeed, which also was the reason for investigating the conversion reaction of methylolmetacrylamide more in detail. The experiments to realize the dimetacrylamidodimethylether by conversion of the methylolmetacrylamide with benzoylchloride

Card 1/3

On the Conversion Reactions of Methylolmetacrylamide 79-28-5-33/69

in alkaline medium according to Zigmmer (Tsigeyner)(Refer ence 3) did not succeed. Being of the opinion that the ether would have to form as a final product in the synthesis of methylene-dimetacrylamide in the presence of acidous catalysts the be-haviour of methylolmetacrylamide in the presence of acidous catalysts was investigated. On heating of the latter with a small amount of hydrochloric acid it could be converted into the dimetacrylamidodimethylether. In the case of increased concentration this ether was converted to the already known methylenedimetacrylamide (see reaction scheme). According to the data by Feuer and Lynch, the methylolmetacrylamide polymerizes on heating in the presence of mineral acids and boron chloride ($B Cl_3$) with formation of unmeltable and insoluable polymers, which fact indicates a three-dimensional structure. The experi-ments carried out by the authors showed that the methylolmet-acrylamide also polymerizes on the action of peroxide stimulaters, in which case polymers of a line or three-dimensional structure can be obtained, depending on the prevailing conditions. In the case of irradiation of this amide with ultraviolet light

Card 2/3

On the Conversion Reactions of Methylolmetacrylamide 79-28-5-33/69

a solid unmeltable polymer results from it. In the masspolymerization in the presence of benzoylperoxide a vitreous polymer forms which is insoluble in water and usual organic solvents. There are 6 references, none of which are Soviet.

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy Akademii nauk SSSR (Institute for High-Molecular Compounds, AS USSR)

SUBMITTED: April 29, 1957

Card 3/3

USHAKOV, S.N.; LEVRENT'YEVA, Ye.M.

Synthesis of vinyl acetate copolymers with crotonic acid and its derivatives. Zhur.prikl.khim. 31 no.11:1686-1691 N '58. (MIRA 12:2)

(Vinyl acetate) (Crotonic acid)

SOV/62-59-1-15/38

5(3)
AUTHORS: Ushakov, S. N., Lavrent'yeva, Ye. M., Podgorskaya, K. S.

TITLE: On the Synthesis of Methylol Croton Amide (O sinteze metilol-krotonamida)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 1, pp 91 - 94 (USSR)

ABSTRACT: There are no data available in publications on the synthesis of methylol croton amide. In the present paper it was obtained by the authors according to the following scheme: crotonic acid → crotonic acid chloride → crotonic acid amide → methylol croton amide. Crotonic acid was synthesized from malonic acid by the interaction with acetaldehyde in pyridine and with ethyl alcohol as a solvent. Crotonyl chloride was obtained by the effect of thionyl chloride on solid crotonic acid. Its yield amounted to 70% instead of 37% as mentioned in publications. There are numerous data on the synthesis of croton amide (Refs 4-9). It was obtained most easily by the effect of crotonyl chloride on liquid ammonia in ether solution at -35°. Methylol croton amide

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SOV/62-59-1-15/38

On the Synthesis of Methylol Croton Amide

was synthesized by the interaction of croton amide with paraform in the presence of sodium ethylate as a catalyst. Table 1 gives some data on some experiments of methylol croton amide synthesis. Methylol croton amide represents needle-shaped crystals which at low temperature are easily dissolved in water, alcohol and dioxane, and on heating in ethyl acetate, vinyl acetate and benzene. It was found that methylol croton amide can form ether on heating without a catalyst. The ether was obtained by heating methylol croton amide in toluene and distilling off the reaction water with the vapors of the solvent in the absence of the catalyst (Table 2). As may be seen from the analysis, the amount of nitrogen in ether approaches the theoretical content, and the melting point increased from 87° for methylol croton amide up to 136° for ether. The ether of methylol croton amide represents needle-shaped lustrous crystals which at low temperature are soluble in acetic acid and on heating in water, dioxane, benzene and xylene. There are 2 tables and 11 references, 1 of which is Soviet.

Card 2/3

SOV/62-59-1-15/38

On the Synthesis of Methylol Croton Amide

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy Akademii nauk SSSR (Institute of High-Molecular Compounds of the Academy of Sciences, USSR)

SUBMITTED: April 27, 1957

Card 3/3

USHAKOV, S.N.; LAVRENT'YEVA, Ye.M.; GEYSBERG, S.M.; SHEMKOV, N.K.

Synthetic fibers from polyvinyl alcohols. Khim.volok. no.4: 3-5 '59. (MIRA 13:2)

1. Institut vysokomolekulyarnykh soyedineniy AN SSSR i Leningradskiy zavod.
(Textile fibers, Synthetic) (Vinyl alcohol)

SOV/62-59-5-18/40

5 (3)
AUTHORS: Ushakov, S. N., Lavrent'yeva, Ye. M., Podgorskaya, K. S.

TITLE: On the Synthesis of Methylene Biscrotonamide (O sinteze metilen-bis-krotonamida)

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 5, pp 888-891 (USSR)

ABSTRACT: There are no references in publications with regard to the synthesis mentioned in the title. These compounds are interesting: they contain nitrogen, two double bonds, and are capable of copolimerization. I. A. Arbuzova carried out tests with acryl derivatives at the authors' institute. In this work, methylene biscrotonamide was synthesized in three different ways: 1) two molecules of methylol crotonamide separate water and formaldehyde, 2) the amide of crotonic acid separates water under the effect of methylol crotonamide, 3) the di-ester of methylol crotonamide separates formaldehyde with thermal treatment. The first reaction took place without catalyst by heating a xylene solution of methylol crotonamide. Table 1 shows data of this synthesis. Nitrogen content, double bonds, melting temperature, molecular weight and solubility of

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On the Synthesis of Methylene Biscrotonamide SOV/62-59-5-13/40

the compound obtained were determined. (Data on analysis in table 2). The second reaction too, took place in xylene, with heating and without a catalyst. Tables 3 and 4 contain the same determinations of substances synthesized in the second way as table 2. Tables 5 and 6 show the corresponding data of the third way of synthesis. In this case the reaction required was brought about by heating the di-ester in various aromatic solvents. The bromine number of the methylene biscrotonamide of the last two compounds obtained was close to the theoretically determined value. There are 6 tables.

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy Akademii nauk SSSR (Institute of High-molecular Compounds of the Academy of Sciences, USSR)

SUBMITTED: August 13, 1957

Card 2/2

SOV/62-59-9-17/40

5 (3)

AUTHORS: Nikolayev, A. F., Ushakov, S. N., Krasnosel'skaya, I. G.

TITLE: Polymerization and Copolymerization of N-Vinyl Compounds. Communication 5. Polymerization of Vinyl Succinimide

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 9, pp 1627 - 1630 (USSR)

ABSTRACT: The present article describes the polymerization of N-vinyl succinimide (VS), which has not been previously described, and the properties of the polymers obtained are investigated. VS was prepared by a method described by the authors in reference 1, by pyrolysis from β-acetooxyethyl succinimide. The polymerization of VS succeeded only by using peroxide initiators. The polymerization was carried out at 50, 65, and 85° with 0.2% benzoyl peroxide (BP) in solid state and in solution. Figure 1 illustrates the influence of the temperature and figure 2 the influence of the concentration of the initiator on the polymerization rate. At 50° a maximum yield (98%) was obtained during 6 hours. The yield decreased with increasing temperature, but the reaction rate increased. The complete consumption of the monomer ended the polymerization. The polymer obtained is colorless, trans-

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Polymerization and Copolymerization of N-Vinyl Compounds. SOV/62-59-9-17/40
Communication 5. Polymerization of Vinyl Succinimide

parent, and becomes porous and opaque when larger quantities of BP are used. The polymerization of the solving agents (dichloroethane, benzene, methyl alcohol, and water) rapidly occurred at 85° even in diluted solving agents and the yield was good. (Table 3). As particular properties of the obtained polymers the following 2 have been established: limited solubility in organic solving agents and a low stability in water (Table 3). There are 3 figures, 4 tables, and 5 references, 3 of which are Soviet.

ASSOCIATION: Leningradskiy tekhnologicheskiy institut im. Lensoveta (Leningrad Institute of Technology imeni Lensovet)

SUBMITTED: January 8, 1958

Card 2/2

.5 (3)

SOV/62-59-9-18/40

AUTHORS: Nikolayev, A. F., Ushakov, S. N., Grinburg, R. B.

TITLE: Polymerization and Copolymerization of N-Vinyl Compounds. Communication 6. Simultaneous Polymerization of Vinyl Succinimide and Methyl Methacrylate

PERIODICAL: Izvestiya Akademii nauk SSSR. Otdeleniye khimicheskikh nauk, 1959, Nr 9, pp 1631 - 1635 (USSR)

ABSTRACT: The appropriate publications have not yet discussed the copolymerization of vinyl succinimide with methyl methacrylate. The present paper describes this copolymerization and lists several properties of the copolymer. To establish the conditions of the copolymerization, the influence of the temperature (50, 65°, Fig 1), and the influence of the composition of the initial components on the rate of the copolymerization reaction was investigated (the experiment lasted 1, 2, and 3 hours, Fig 2). The investigations established that methyl methacrylate is the more active component in the copolymerization. The analysis data, table 1, show that a small part of the succinimide was consumed at the copolymerization. For the acceleration of the reaction the initiator benzoyl peroxide (BP) and azodi-isobutyronitrile (AN)

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Polymerization and Copolymerization of N-Vinyl Compounds. SOV/62-59-9-18/40
Communication 6. Simultaneous Polymerization of Vinyl
Succinimide and Methyl Methacrylate

were additionally applied. The data obtained (Fig 3) show that AN initiates more efficiently at low temperatures, this difference is equalized by the increase of the reaction temperatures. The authors investigated the concentration relations of the basic substances 5:1, 2:1, 1:1, 1:2. Applying the initiator BP in the ratio 1:1 of the basic component and at 65-70° a yield of 95-98% was obtained within 7-8 hours. The copolymer was a thin, porous film after the evaporation of the solvent. This film rapidly softens when warmed. The authors also investigated the molecular weight, water-repelling capacity, temperature stability, solidity, density, and tensile strength of the products obtained, and it showed that with an increase of the vinyl succinimide content the three first-mentioned values decrease, while the latter increase. The copolymer with 50% of vinyl succinimide content has a greater temperature stability at 30° than pure methyl methacrylate. There are 3 figures, 3 tables, and 4 references, 3 of which are Soviet.

Card 2/3

Polymerization and Copolymerization of N-Vinyl Compounds. SOV/62-59-9-18/40
Communication 6. Simultaneous Polymerization of Vinyl Succinimide and Methyl Methacrylate

ASSOCIATION: Leningradskiy tekhnologicheskiy institut im. Lensoveta (Leningrad Institute of Technology imeni Lensovet)

SUBMITTED: January 8, 1958

Card 3/3

SOV/80-32-3-36/41

5(3)

AUTHORS: Ushakov, S.N., Nikolayev, A.F., Toroptseva, A.M., Trizno, M.S.

TITLE: The Synthesis of Monoalkylmaleates (Sintez monoalkilmaleinatov)

PERIODICAL: Zhurnal prikladnoy khimii, 1959, Vol XXXII, Nr 3, pp. 667-672 (USSR)

ABSTRACT: The derivatives of dibasic acids polymerize with various mono- and divinyl compounds. The monoesters of maleic acid are investigated here. They are prepared by the reaction of maleic anhydride and primary, secondary, tertiary alcohols of the aliphatic, cyclic and aromatic series. Monoethyl maleate is obtained from maleic anhydride and absolute ethyl alcohol. It is separated from the reaction mixture by potash, ether, alcohol, diluted hydrochloric acid etc. The optimum temperature for the reaction is 80°C. A lowering of the temperature to 60°C reduces the reaction rate considerably. A temperature increase leads to decomposition of the monoester. The monoesters of the maleic acid are colorless, transparent viscous liquids with a characteristic odor. They

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The Synthesis of Monoalkylmaleates

storing but not to heating. Their specific weight decreases with the increase of the molecular weight of the alcohol (Table 3).
There are 3 tables and 7 references, 1 of which is Soviet, 3 English, 2 American and 1 Swiss.

SUBMITTED: January 7, 1958

Card 2/2

SOV/20-128-1-31/58

5(3)
AUTHOR: Ushakov, S. N., Corresponding Member AS USSR

TITLE: Some Reactions in the Chains of Vinyl Alcohol Copolymers

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 128, Nr 1, pp 117-120 (USSR)

ABSTRACT: The author in collaboration with his co-workers I. A. Arbuzova, S. A. Plotkina and I. Santo (Refs 1 and 2) suggested a series of new cross-linking divinyl agents, which yield good results in the heteropolymerization with acryl derivatives and vinyl esters. Diallyl acetates of various aldehydes (formal, ethylal, butylal) were thoroughly investigated in their function as active agents. Diethers of the methylol croton amide and methylene-bis-croton amide belong to another group of particularly active agents (Author and Ye. M. Lavrent'yeva, K. S. Podgorskaya, Ref 3). A far more complete process of the formation of polymers is warranted by cross-linking of long, linear marcomolecules by condensation of the reagent functional groups contained in the chain. In order to avoid ring formations in the copolymeric chain it is expedient to introduce the functional groups by heteropolymerization. As an interesting example for such processes serves the copolymerization suggested

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Some Reactions in the Chains of Vinyl Alcohol Copolymers

and carried out by the author together with Ye. M. Lavrent'yeva and K. S. Podgorskaya of vinyl acetate and other vinyl esters with methylol croton amide and croton amide. Copolymerization with methylol croton amide may be carried out in the solid state or in liquid in the presence of initiators of the radical polymerization such as benzoyl peroxide, acetyl benzoyl peroxide, and dinitro azoiso butyric acid. The linear heteropolymers thus obtained are thermoactive and on heating form non-melting and insoluble polymers of steric structure. On the basis of an investigation of the mechanism of the radical polymerization of vinyl acetate with croton amide and methylol croton amide carried out by the author in co-operation with B. L. Trukhmanova the copolymerization constants of these systems could be determined. The new copolymers of vinyl esters and vinyl alcohol with methylol croton amide (and croton amide) may find a wide range of application from the practical point of view. Thermically treated copolymers are of a far higher mechanical stability than the pure polyvinyl alcohol. They are absolutely insoluble both in the cold and boiling water. The thermoactivity characteristic of the linear copolymer and caused by the introduction of links with non-adjacent functional groups offers

Some Reactions in the Chains of Vinyl Alcohol Copolymers

great prospects for their technical applicability. The new group of heteropolymers with crotonic acid derivatives is of the greatest interest for the manufacture of covers, synthetic materials and synthetic fibers. There are 1 table and 6 Soviet references.

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy Akademii nauk SSSR (Institute of High-molecular Compounds of the Academy of Sciences, USSR)

SUBMITTED: May 18, 1959

S/030/60/000/03/008/044
B015/B008

AUTHOR: Ushakov, S. N., Corresponding Member of the Academy of Sciences USSR

TITLE: New Soviet Synthetic Fiber "Vinilon"

PERIODICAL: Vestnik Akademii nauk SSSR, 1960, Nr 3, pp 52-54 (USSR)

TEXT: In the paper under review the author reports on the development of the manufacture of this fiber in the USSR, for which acetylene is used as the main raw material. The essential values of the properties of the fiber from polyvinyl alcohol, called "Vinilon", are mentioned in the table. The Institut vysokomolekulyarnykh soyedineniy Akademii nauk SSSR (Institute of High-molecular Compounds of the Academy of Sciences USSR) worked out the production methods for polyvinyl acetate and polyvinyl alcohol. Experimental batches of polyvinyl alcohol were produced in the experimental plant of the Nauchno-issledovatel'skiy institut polimerizatsionnykh plastmass (Scientific Research Institute for Synthetic Polymerization Materials). Studies concerning the production of new types of fibers on the basis of polyvinyl alcohol are carried out at these 2 institutes, the papers by S. N. Ushakov and Ye. M. Lavrent'yeva who first used thermoreactive copolymers of vinyl alcohol especially with methyl croton amide and croton amide, being mentioned. Finally the author expresses the hope that

Card 1/2

New Soviet Synthetic Fiber "Vinilon"

S/030/60/000/03/008/044
B015/B008

the joint research of the Institute of High-Molecular Compounds, the competent special research institute and an industrial enterprise will make it possible to produce new synthetic fibers on the basis of copolymers of vinyl alcohol. There is 1 table.

Card 2/2

USHAKOV, Sergey Nikolayevich; MATVEYEV, I.I., kand.khim.nauk, otv.red. [deceased]; CHIZHOV, A.A., red.izd-va; KRUGLIKOVA, N.A., tekhn.red.

[Polyvinyl alcohol and its derivatives] Polivinilovyi spirt i ego proizvodnye. Moskva, Izd-vo Akad.nauk SSSR. Vol.2. 1960. 866 p. (MIRA 14:1)

(Vinyl alcohol)

USHAKOV, S.N., prof. (Leningrad); SZANTO, Istvan (Budapest)

Investigations on crosslinked polymers. I. Preparation of crosslinked polyvinyl acetate and polyvinyl alcohol, and characterization of their properties. Acta chimica Hung 24 no.3:343-356 '60. (EEAI 10:3)

1. Technological Institute, L.T.I., Leningrad (for Ushakov). 2. Central Research Institute for Chemistry, Hungarian Academy of Sciences, Budapest (for Szanto)
(Polymers and polymerization) (Vinyl alcohol)
(Vinyl acetate) (Formaldehyde) (Acetals)
(Butyraldehyde) (Aldehydes) (Acetates)

S/020/60/134/003/032/033/XX
B016/B060

AUTHOR: Ushakov, S. N., Corresponding Member AS USSR

TITLE: Production of Films, Threads, Poroplasts, and Thixotropic Gels From Iodine Complexes of Polyvinyl Alcohol and Its Copolymers

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 3, pp. 643 - 646

TEXT: The author first describes the formation of "deposits" from iodopolyvinyl alcohol, which, while being gradually resorbed, give rise to local zones of antimicrobic effect in the organism, and retain this effect only provided thixotropic gels are used for the purpose. The application of films, threads, poroplasts, and thixotropic gels from polyvinyl alcohol had not been described before. The author established that iodopolyvinyl alcohol is thermally unstable, decomposes at 40-60°C, and loses its antimicrobic properties. The usual methods of preparing the said products of iodopolyvinyl alcohol are therefore inexpedient and not applicable for any practical purpose. The author found a possibility

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of getting around all these difficulties by having the iodine complex of polyvinyl alcohol result from polyvinyl alcohol through heterogeneous reaction on the surface of films, threads, and poroplasts. For this purpose they are immersed into an iodine solution. Polyvinyl alcohol selectively sorbs iodine from iodine solutions in aqueous solutions of iodine salts (potassium, ammonium, and other iodides). This gives rise to colored complexes. The author describes this reaction and its most favorable conditions, and specifies the sizes of films and threads used. The method described here is also suited for the production of pulverulent iodopolyvinyl alcohol. It has certain advantages over the usual methods (Ref.4). The author's method acquires a special significance when using fine-disperse powders of "cross-linked", insoluble polyvinyl alcohol, which are, among other things, used for disinfecting wounds or sterilizing water. The author has worked out such powders as are specially suited for treatment with the heterogeneous reaction. He used the method of emulsion copolymerization of vinyl acetate with 0.1-3.0 mole% of tetrareactive compounds which, together with vinyl acetate, form

heteropolymers. As tetrareactive compounds, the author suggested diallyl acetals (jointly with I. Arbuzova and S. Plotkina, Ref.6) or derivatives of crotonic acid (methylol crotonamide diether, methylene-bis-crotonamide). The resulting emulsion was destroyed by the addition of NaCl electrolyte; the powder was filtered off, dried in vacuum, and subjected to a heterogeneous methanolysis with absolute methanol. The complete heterogeneous saponification did not destroy the acetal bonds of diallyl formal bridges between the chains, and the spatial "cross-linked" copolymer structure remained unaltered. Emulsion polymerization of vinyl acetate with other diallyl acetals proceeds in an analogous manner. These high-disperse powders (particle size up to micron fractions) cannot be produced by the comminution of polymers, and are specially suited for the production of iodine complexes. V. Mokhnach, S. Andreyev, M. Litvinov, L. Borisov, Ye. Lavrent'yeva, K. Podgorskaya, and I. Santo are mentioned. There are 9 references: 5 Soviet, 1 Canadian, 1 British, and 3 German.

Production of Films, Threads, Poroplasts, and Thixotropic Gels From Iodine Complexes of Polyvinyl Alcohol and Its Copolymers

S/020/60/134/003/032/033/XX
B016/B060

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy Akademii nauk SSSR (Institute of High-molecular Compounds of the Academy of Sciences USSR)

SUBMITTED: April 21, 1960

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84830

S/020/60/134/005/018/023
B016/B054

15.8116 2209 only
11.2217

AUTHORS: Ushakov, S. N., Corresponding Member AS USSR and Belogorodskaya, K. V.

TITLE: On the Synthesis of Silicon Derivatives of Polyvinyl Alcohol

PERIODICAL: Doklady Akademii nauk SSSR, 1960, Vol. 134, No. 5, pp. 1115-1118

TEXT: As there are no data published on the production of various silicon derivatives of polyvinyl alcohol which are used to modify its properties, the authors tried to produce these derivatives (general formula $-CH_2-\underset{\underset{OSiR_3}{|}}{CH}-CH_2-\underset{\underset{OH}{|}}{CH}-CH_2-$, where R is an alkyl-aryl or aralkyl). For this purpose, they used the following reactions: a) of chloro silanes with polyvinyl alcohol as well as with its alcoholates in a heterogeneous medium; b) of chloro silanes with partially saponified polyvinyl acetate in a homogeneous medium; c) of trialkyl aminosilanes with polyvinyl

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84830

On the Synthesis of Silicon Derivatives of Polyvinyl Alcohol

S/020/60/134/005/018/025
B016/B054

alcohol in a pyridine medium. In the case a), there are difficulties due to the good reactivity of chloro silanes with water, pyridine, formamide, and other solvents of polyvinyl alcohol. In the heterogeneous reaction under a), the finely ground powders of polyvinyl alcohol, its alcoholate, and its alkaline derivative were suspended in benzene, mixed with trimethyl chlorosilane, and stirred at 20-70°C for 7-24 h. This did not lead to a noticeable substitution of the hydroxyl groups of the alcohol by alkyl silicon radicals. Further, partially saponified polyvinyl acetates (case b)) were used which maintain their solubility in benzene. To attain the latter reaction, the alcoholysis must be carried on to a maximum content of 10 mole% of hydroxyl groups in the polyvinyl acetate chain. The reaction under b) was carried out in benzene or in a benzene-dioxane mixture. The medium was absolutely anhydrous The resulting HCl was bound with suspended $MgCO_3$, which is of great importance. The product obtained was precipitated from a filtered solution with petroleum ether, purified by dissolving it twice in dioxane, and precipitated with water (Table 1). Thus, 50-70% of all free hydroxyl groups of the partially saponified polyvinyl acetate were substituted. No noticeable destruction occurs. The resulting copolymers with a Si content of 4.8% have an

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On the Synthesis of Silicon Derivatives of Polyvinyl Alcohol

S/020/60/134/005/018/023
B016/B054

increased vitrification temperature: T_{vitr} = 38°C. In the case c), the same apparatus was used as in the case b) (a three-neck flask with recooler). The pyridine used was absolutely dry, and protected from air moisture. Previously, polyvinyl alcohol was swelled in pyridine for 18-20 h. The reaction mass is completely homogenized within 1.5-2 h. The reaction product was precipitated with various organic liquids since its solubility strongly fluctuates depending on the degree of substitution. The authors found that under the above conditions an organosilicon ether of polyvinyl alcohol is formed. Table 2 shows results of some special experiments of the reaction of the above ether with triethyl aminosilane. Hence, it appears that triethyl silyl ethers of polyvinyl alcohol were obtained with different degrees of substitution. Table 3 shows the solubility of some products obtained, Table 4 lists their properties. There are 4 tables and 4 references: 3 Soviet and 1 US.

SUBMITTED: June 10, 1960

Card 3/3

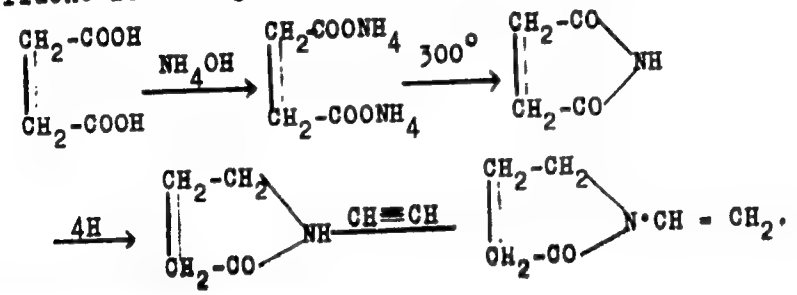
S/062/61/000/005/007/009
B118/B220

AUTHORS: Ushakov, S. N., Davidenkova, V. V., and Lushchik, V. V.

TITLE: Synthesis of vinyl pyrrolidone

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 5, 1961, 901 - 905

TEXT: Starting from succinic acid, the authors synthetized in 1952 vinyl pyrrolidone according to the equation



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S/062/61/000/005/007/009
B118/B220

Synthesis of vinyl...

The succinimide was obtained from the ammonium salt of the succinic acid at 300°C and, after purification, reduced electrolytically to pyrrolidone on lead electrodes (80 to 90mA/cm²) in 50 % sulfuric acid. Vinylizing of pyrrolidone was effected in dioxane solution in the presence of potassium pyrrolidone in the autoclave under a pressure of 15 to 25 atm and at 125 to 132°C. This method is easier than that proposed by W. Reppe (Ref. 1, Polyvinylpyrrolidon, 1954, Berlin). The vinyl pyrrolidone produced was used for the synthesis of polymers which in the Leningradskiy institut perelivaniya krovi (Leningrad Institute for Blood Transfusion) have proved to be good blood substitutes. Independently of this paper and almost at the same time, data were published concerning the synthesis of pyrrolidone from succinic acid and ammonia via succinimide (C. 1953, 9185; Rev. Plastic, 2, 110, 132). But also for this modified synthesis, the last part of the vinylizing, effected under pressure and using acetylene, is rather difficult. In a series of cases it was, therefore, of advantage to realize the synthesis without acetylene and without increasing the pressure (e. g. according to the equation by B. Puetzer et al., J. Amer. Chem. Soc. 74, 4956 (1952)). Unlike the USA Patent 2669570, the authors of the present paper succeeded in synthetizing vinyl pyrrolidone from succinic acid by

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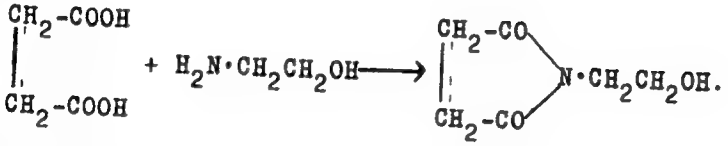
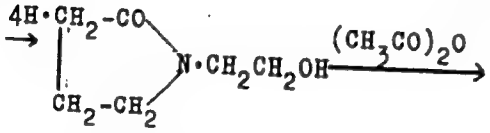
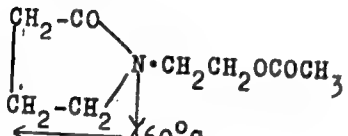
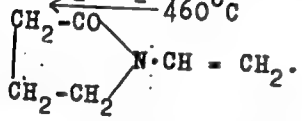
Synthesis of vinyl...

using neither pressure nor acetylene:

I. 

II. 

III. 

IV. 

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Synthesis of vinyl...

Based on succinic acid and using easily obtainable reagents (monoethanol amine and acetic anhydride), they contained, thus, vinyl pyrrolidone by pyrolysis in 4 stages, without acetylene and increased pressure (yield: 52 % of the theoretical-one). There are 9 references: 5 Soviet-bloc and 4 non-Soviet-bloc.

ASSOCIATION: Institut vysokomolekulyarnykh soyedineniy Akademii nauk SSSR (Institute of High Molecular Compounds of the Academy of Sciences USSR)

SUBMITTED: April 9, 1960

25217 S/062/61/000/007/007/009
B117/B215

15.8050

AUTHORS: Nikolayev, A. F., Ushakov, S. N., and Daniel', N. V.

TITLE: Polymerization and copolymerization of N-vinyl compounds

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 7, 1961, 1330-1336

TEXT: Information 8. Polymerization of vinyl succinimide in aqueous solution. This paper continues the study of polymerization of vinyl succinimide in aqueous solution in the presence of an initiator soluble in water. Potasium persulfate was used. Vinyl succinimide was prepared and purified by the method of Ref. 9 (S. N. Ushakov i A. F. Nikolayev, Izv. AN SSSR. Otd. khim. n. 1956, 226). Potassium persulfate was analyzed according to a method suggested for determining peroxide compounds (Ref. 10: A. Schwicker, Z. analyt. Chem. 74, 433 (1928)). For the polymerization of vinyl succinimide a flask with a mixer and mercury sealing, reflux condenser, and thermometer were used. A number of experiments were conducted in nitrogen atmosphere or without mixing. By adding formaldehyde (in the form of formalin) and uric acid, the length of

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the polymer chains was regulated, and their cross-linking eliminated. The reaction temperature was maintained at 70° and 80°C with an accuracy of ±0.2°. A 10% aqueous vinyl succinimide solution was used in all experiments. The reaction was continued until a 95-98% transformation was attained. Examination of the polymerization under static conditions and with stirring showed that the rate of the process largely depends on hydrodynamic conditions. Vigorous mixing completely inhibits polymerization. Slight mixing slows the process down. At an initiator concentration of more than 0.2% and a temperature of 70-80°C, the reaction proceeds fast only without mixing. Experiments in nitrogen atmosphere showed that polymerization in this case was normal with stirring and also under static conditions. Hence, it can be seen that atmospheric oxygen has an inhibitory effect on the polymerization of vinyl succinimide under the above reaction conditions, especially at temperatures below 70°C and with stirring. It was expected that oxygen loses its inhibitory effect when the reaction temperature is elevated. Actually, polymerization of vinyl succinimide is fast at 80°-90°C and at any mixing rate. At lower temperatures, however, no polymers were formed. By adding 16% or more formalin and 10% or more uric acid, a polymer forms which is soluble in

Polymerization and copolymerization... 25217

chlorinated hydrocarbons, especially methylene chloride and chloroform (Table). The necessity of using chain propagators in the polymerization of vinyl succinimide indicates that the polymeric vinyl succinimide radical is most reactive. From this results its ability of propagating the chain via the polymer. By elevating the temperature from 65° to 80°C the polymers become better soluble. This is due to the reduced molecular weight of the resulting polymer. The polymerization of vinyl succinimide in aqueous solution is fast and complete in the presence of potassium persulfate. An analysis of the dependences of polymerization leads to the following conclusions: (1) In water, the water-soluble initiator decomposes into primary radicals, part of which is recombined. The greater part, however, is bound by vinyl succinimide. (2) Polymerization requires a strongly effective initiator. (3) During the reaction poly-vinyl succinimide is separated from the solution. This process, however, does not affect the increase in viscosity of the reaction medium. (4) The full rate of polymerization is proportional to the square root of the initiator concentration not only in the initial stage, but also at high-degree transition. This conclusion is confirmed by experimental data in the range of the potassium persulfate concentrations examined, namely,

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